JOURNAL

OF THE

CANADIAN PEAT SOCIETY

Volume 2

Published Quarterly by the Society
Subscription Price - $1 per annum
Single Number - Twenty-five cents

CANADIAN PEAT SOCIETY
Room 22, Castle Building Ottawa, Canada

INDEX TO VOLUME 2.

Vol. 2 FEBRUARY, 1913 No. 1

JOURNAL

OF THE

CANADIAN PEAT SOCIETY

Published Quarterly by the Society
Subscription Price - $1 per annum
Single Number - Twenty-five cents

CANADIAN PEAT SOCIETY
Room 22, Castle Building Ottawa, Canada

TABLE OF CONTENTS

Panoramic view of Alfred Peat Bog and plant, showing the "Anrep" excavating machine in operation, 1912.

Journal of the
Canadian Peat Society

Vol. 2 FEBRUARY, 1913 No. 1

THE NEW ALFRED (ONT.) PEAT FUEL PLANT.

(From a paper written for the Sixth Annual Meeting of the American Peat Society, by Ernest V. Moore, B.Sc., Mi.E., Peterboro, Ont.)

The demonstration plant erected at Alfred by the Department of Mines having been successfully operated during the seasons of 1910 and 1911, and the purpose of its installation accomplished, arrangements were made in the latter year by which the operations will be carried on in future by private capital. The portion of Mr. Moore's article following deals with the progress of work subsequent to such arrangement.—Ed.)

In the fall of 1911 negotiations were completed between the Department of Mines, and Mr. J. M. Shuttleworth, of Brantford, Ont., to continue the work at Alfred, Mr. Shuttleworth undertaking to provide a plant conforming with the general plans suggested by the Director of Mines.

Under a separate agreement with Mr. Shuttleworth, the writer undertook to design, build, install and operate this plant, and a contract was made for its delivery about the first of April last. Complete delivery was not made until the end of June. Certain alterations found necessary after it was first tried out, caused further delay, and only about the end of the season was the plant declared in satisfactory running order. About 100 tons of fuel were made under conditions that demonstrated beyond a doubt that a better quality of fuel, in uniformity of dryness, in appearance, and in the quality of the blocks themselves, than that made by the Department, was being turned out, and the cost of manufacture was but a fraction of that experienced in the earlier operations. This new plant now stands on the bog at Alfred complete in so far as the operation of making the fuel is concerned, and ready for a full season's operation in 1913, when it is expected that work will be energetically carried on.

As now installed this plant consists of five distinct parts which for clearness' sake will be taken up separately. They are the Power House, the Excavator and Macerator combined, an overhead Cableway, the Spreader, and the Harvesting Equipment.

The Power House is built on solid ground on the shore of the bog about a quarter of a mile from the drying field. The equipment consists of an ordinary horizontal, return tubular boiler, about 80 or 90 horsepower, encased in brick according to standard practice as to size of grate, distance from boiler shell, etc. In this connection it is interesting to note that this boiler was fired entirely with peat and that the fuel proved in every way satisfactory. With the full plant in operation, the switchboard showed a maximum of 15 amperes at 2,200 volts, or nearly 60 H.P., and at no time was there over two and one-half tons of fuel consumed in 10 hours. This fuel would average about 20 per cent. water content. A 13x30-inch Corliss engine running at 90 R.P.M., is used to turn over a 100 KVA, 3-phase, 60-cycle, 2,200-volt alternator with its excitor. These are connected up with a switchboard fully equipped with measuring instruments, and from this switchboard the power line leads to the working field on the bog. The current is carried the whole length of the drying ground, parallel to the line along which the excavator moves, and a short distance away from it.

The Excavator and Inside Tower, taken from front side. Excavator moves towards spectator. The transformer house on the excavator car is visible, and the traverser is seen at the left-hand end of the oblique bridgework; also, the trough conveying the excavated peat to the macerator.

The Excavator and Macerator were designed and patented by the late Mr. A. Anrep, of Helsingborg, Sweden, and were built entirely from plans supplied by him, the making of which constituted his last active work with peat. Like the Anrep device installed by the Government, this combination of machinery rests on a primary car, supported by three sets of wheels, on three parallel tracks. The rails forming these tracks are in short sections, and the ties are arranged to be conveniently moved ahead from time to time as the machine progresses. On the rear side of this car is superimposed a horizontal structural steel bridgework supporting two parallel rails, at an angle of 45 degrees with the direction of the motion of the car, the reason for which will be explained later. This primary car

also supports a transformer house in which is situated step-down transformers to bring the 2,200-volt current down to 550 volts, at which pressure it is distributed through a number of oil immersed starters, to a 30 H.P. induction motor which drives the cableway and to the trolley wires of a 5 H.P. motor on the spreader. The last two motors are connected up with the starters with flexible conductors to permit of a relative movement between the excavator-macerator and the end tower of the cableway.

Travelling on the oblique rails already mentioned is a light steel framework which automatically moves from one side to the other the full width of the excavation, and in this is supported the excavating element. This traverser, driven by its own motor, is practically an independent device traveling slowly backward and forward on the oblique rails, excavating a layer from the working face each journey. The excavating element is a simple and strong bucket and chain elevator, the top half of which works in this framework while the lower half is supported by an arm the outer depth of which can be raised or lowered to regulate the depth of the excavation. When digging 9 feet deep this arm points downward at an angle of about 45 degress, and owing to the oblique direction of travel of the traverser, not only the excavated face, but also the side standing wall, are left on practically a natural slope. This is a very important feature of this excavator, as it permits a second cut being made without fear of a cave in.

In operation, the primary car remains stationary, while the traverser makes one journey from one side to the other. The whole device is then moved ahead about eight inches and the traverser makes its return journey, and so on, continuously. The main car is moved ahead by power, six of its supporting wheels being drive wheels.

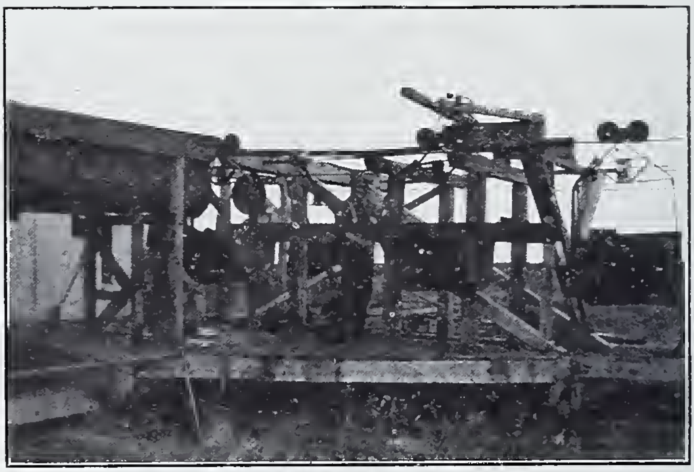
The excavator dumps into a trough supported on the front side of the bridgework, running the full length of its travel and from this trough the peat is delivered into the macerator which is also rigidly attached to the primary car. The current is brought from the power line by three flexible, heavily insulated conductors which are plugged in on the main line each morning before the current is turned on at the power house. These conductors are sufficiently long for a day's operations.

The excavator has lived up to expectations. It cuts a clean trench up to 10 feet deep, and about 29 feet wide. Owing to the number of large roots in the Alfred bog, one attendant is necessary in the working trench to pull these out of the way of the excavating buckets and no difficulty has been experienced in working practically continuously. Should a short delay occur, however, the capacity of the excavator is so much greater than that of the rest of the plant, that no delay is occasioned in the general operations.

The Macerator is the largest size of Anrep Macerator yet made. It will deliver raw peat for between 6 and 7 tons of fuel per hour, with a 30 H.P. motor and a larger amount with more power.

From the Macerator the peat travels or is propelled by a 16-inch spiral conveyor to a loading hopper situated on the inside end tower of the cableway.

The Cableway, provided to take macerated peat to the Spreader, consists essentially of two towers placed opposite each other about 900 feet apart, and so supported on wheels, resting on rails held in place by ties of peculiar construction, that they can move only in a direction at right angles to a line drawn from one tower to the other, distance between the towers remaining the same. The towers are connected by two parallel cables in the same horizontal plane strung from anchorage on them. At either end means are provided to put any desired strain on the cables, and on each tower, connecting the ends of the cables, are rigid, semi-circular tracks, so attached to the cables that a continuous and endless single track is obtained in the form of a horizontal loop, about 900 feet long, and 9 feet wide, the whole being about eight and one-half feet above the bog surface.

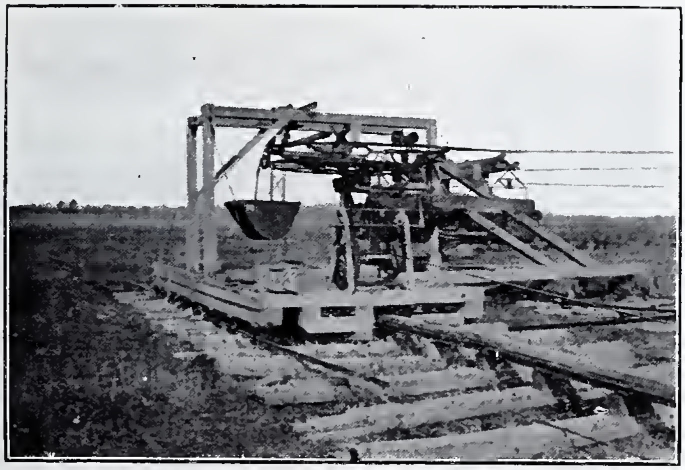


The Inside Tower, showing Loading Hopper and Buckets.

Intermediate between the end towers are light wooden supports spaced about every 75 feet. These also are on wheels that permit their movement only in a direction parallel to that of the end towers. They support the cable by special cable saddles as a clothes line pole supports a clothes lines, thus keeping the cables parallel, and their proper distance from the ground.

Twenty-four steel buckets of 10 cubic feet capacity each are provided. They are slung in a bale which permits them to be dumped by loosening a catch. The buckets are supported from the cable track by a two-wheeled truck to which the bale is fastened with a flexible joint. On the bale of the buckets is fixed a clutch to engage a haulage cable by means of which the buckets are given their desired motion. The haulage cable is endless and receives its motion from a series of drums and pulleys situated on the inside tower, i.e., the one nearest the excavator. On this tower is fixed the 10 H.P. motor driving the cableway. This cable passes out parallel to and below the track cable used to take up the loaded buckets,

passes around a large cable sheave on the outside cableway tower which supports and directs it so that it still keeps directly below the semi-circular track, and, returns parallel to and underneath the track cable on which the emptied buckets return to the inside tower again. This cable is supported in the clutches on the bales of the buckets, and these are about 75 feet apart when running so that it is not possible for two loaded buckets to get between any two consecutive cable supports at the same time. The clutches are designed so that they automatically pick up and engage this haulage cable as they are pushed out, filled, from the loading hopper. When the bucket reaches the place where it is desired to dump, the



The Outside Tower, showing Ties and Rail in vertical plane which takes up the strain of the Cables.

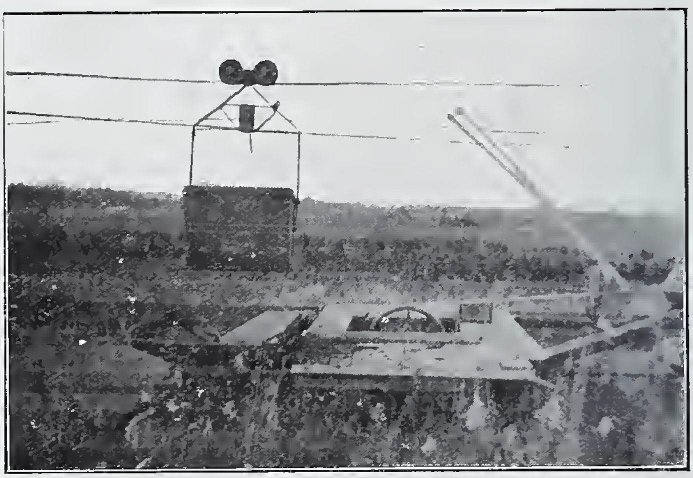
clutch can conveniently be made to loosen so that the cable passes through the clutch without coming out of it, and, when the bucket is dumped, by a slight movement of the clutch lever, it again takes hold, passes the bucket around the semi-circular track on the outside tower without letting go the cable and continues to hold until the bucket arrives at the inside tower, where it receives its load again. Here the clutch automatically lets go the haulage cable, altogether, and permits it to pass over a guide pulley to the drums that give it motion. The bucket, in the meantime, continues its journey by gravity for a short distance until it is again convenient to the loading hopper.

The ties supporting the end towers need some description. When the cableway is in operation a sufficient strain must be put on the track cables so that when the bucket and its load, about 1,000 pounds in all, is in the center of a span, there will not be over twenty-four inches deflection. This means a strain of many tons pulling these towers together. To make the towers sufficiently heavy to resist this pull would make them too cumbersome to move, conveniently, if at all. It has therefore been necessary to anchor the ties into the bog, so that they would resist this pull and at the same time, to attach the towers to the ties so that the towers might be moved when desired, and still maintain the strain on the cables. This has

been successfully done by bolting anchor plates to the under side of the ties and arranging a horizontal rail in a vertical plane, fastened to the upper side of the ties, against which vertical wheels fixed in the framework of the towers, rest, and transmit the pull on the cables to the anchor plates. By a simple arrangement the rails which take up the strain at each end tower are adjusted so that they are parallel, and the end towers kept a uniform distance apart as they move.

The Spreader starting up, showing section of Moulded Peat.
Cross-cutting Device not on.

On each end tower is fixed a hand winch which is used to draw in on a cable fixed to an anchorage some distance away, by which, when desired, even with the full strain on the main cables, the end towers may be moved ahead at right angles of course, to the direction of the cable strain, and parallel to the direction of



Side View of Spreader.

motion of the excavator-macerator. So great is the strain on the track cables that the intermediate supports move along also, practically maintaining the line of the cableway.

Finally, on the intermediate supports there is arranged a projecting arm which carries a three-wire trolley, from which power is obtained to operate the Spreader. These wires are parallel to the cable track carrying the loaded buckets and such distance away, that the Spreader, running underneath, is conveniently located to receive peat from the buckets.

In practice, after some minor difficulties had been overcome, this device was found to work easily and without a hitch. Patents covering it have been applied for.

The Spreader is again a device somewhat different to anything yet attempted in connection with the manufacture of machine peat fuel. It is used more or less of necessity, with a cableway or other elevated means of distributing the peat pulp, as the raw material could not conveniently be dumped into it from such dump cars as have usually been used. With this device an attempt is successfully made to place the moulded peat on the drying ground, absolutely uniform in thickness and section, and instead of dumping it with some force into the bog surface which of necessity makes it adhere and dry around small twigs, and pick up quantities of moss, etc., the moulded peat is gently laid on a surface on which all projections have been smoothed down. Again, the peat is moulded under a slight pressure and the section has rounded edges which adds materially to the quality of the finished product. The rounded corners makes less fine particles in the fuel after it has been handled two or three times in reaching the consumer's storage.

The Spreader is essentially a box into one end of which the peat pulp is dumped. It is uniformly distributed in this box by a special screw conveyor, and it is discharged again from the box which is trailed along on the ground, through thirty-four moulding spouts placed side by side in such position that the peat is forced out without any drop, onto the ground. This is accomplished by providing a separate screw to feed each spout and arrangement is made to regulate these screws so that the peat may be delivered from the spouts at any desired rate within a big range. The box is flexibly fastened to a caterpillar tractor, designed specially for this purpose, and which, at present, hauls it along at about eighty-four inches per minute. Power is obtained from the trolley wires above and the device is steered by a tiller, conveniently placed. An attachment is also provided, fastened to the rear of the Spreader, which cross-cuts the peat uniformly every eight to ten inches as desired.

It is found that the capacity of the Spreader varies directly as the speed of its driving motor. As it has been run, thirty-four strips, 4 inches by 4 inches are laid down side by side, making a strip almost exactly 12 feet wide. It moves 7 feet in a minute, so that 12x7x1-3, equals 28 cubic feet are spread per minute. If there were no delays this means the spreader has a capacity of 9 tons of 25 per cent. moisture fuel per hour.

The spreading box proper when loaded, with all its moving parts, weighs be-

tween three and four thousand pounds and as it is dragged over the drying field surface, all twigs, bits of moss, in fact, small inequalities in the bog surface itself, are smoothed down, and the peat gently laid on. The adjustment permitting the regulation of the rate at which the peat leaves the moulding spouts permits keeping this exactly the same as the movement of the spreading box, no matter how soft, or stiff, the pulp may be, and a very uniform section is obtained. The moulding dies are slightly rounded at the corners which moulds the peat this way also.

This device, as well as the others, has proven most satisfactory, producing a fuel evidently superior to that made from the same raw material by less complete methods of moulding. Like the cableway, patents have been applied for, to cover it.

In operation all these devices work harmoniously together. The drying area at Alfred, at present, is a rectangle three thousand feet long north and south, and a thousand feet wide, east and west. The Excavator, starting at the northeast corner, works along the eastern boundary in a southerly direction. It cuts out a prism 29 feet wide and the full depth of the peat. This is spread directly west of the Excavator, everything dug in a forward movement of this device of thirteen feet, nine inches, being spread in a strip twelve feet wide, running east and west. To do this the Cableway is located in a straight east and west direction, the inside tower being adjacent to the Excavator, and to the sixteen-inch spiral conveyor leading from the Macerator.

General View of Drying Field.

When the plant is in operation the Excavator moves ahead in eight-inch steps for a distance of thirteen feet, nine inches. The loading hopper on the cableway tower is this long, so that no matter where the Excavator is in this length of movement, it discharges into the loading hopper. From here it is dispatched, seven buckets every two minutes, along the cableway, from which it is dumped into the Spreader and laid on the bog surface, moulded. As soon as the Excavator has

reached the end of a thirteen foot, nine inch run, it is stopped, while the end towers, and with them the whole cableway, is moved ahead another thirteen feet, nine inches, by means of the winches provided for this purpose, and the Spreader is turned around ready for a return trip. This complete operation takes fifteen minutes of non-productive labor at present. This means about one minute lost in shifting for every ton of fuel made, but this might be cut down to one-half the amount if power were used to work the winches. In any case, it compares favorably with the smaller plants, where at best, three to three and one-half minutes are lost shifting tracks for every ton of fuel spread.

Apart from the men used at the power house, one man runs the Excavator without help except such as is given by the man removing roots out of the way. The ties and rails supporting this machine are kept moved ahead by a gang of three men who also, during the time in which one row is being spread, i.e. about two hours, move and put in place five ties for each end tower, and shift a light section of track thirteen feet, nine inches long, for each intermediate support to the track cables of the cableway. This they can do quite easily. The Cableway is operated, that is, the buckets are loaded and started away, by two attendants, and they are again dumped into the Spreader, and the Spreader looked after, by three more attendants. These men and the superintendent are all that are necessary for the complete operation of getting the peat moulded on the ground. The capacity of the plant, as run, is sixty tons of fuel, equal to three hundred and sixty tons of raw material, per ten hours, but, it has been operated at twenty-five per cent. greater output than this for shorter periods, and it is expected that the larger capacity can eventually be maintained under favorable conditions.

The whole plant, then, is a single combined unit nearly one thousand feet long, which starts at one end of the drying area and travels, in toto, straight down the drying area, moving thirteen feet, nine inches each step. The fuel is left moulded on the ground in parallel rows twelve feet wide, separated by a space of one foot, nine inches.

In a few days up to a week the moulded peat is stacked by hand into little piles. This is done by contract, and when the peat is dried down to 25 per cent. water content it is ready for the cars.

The harvesting arrangements at Alfred, the last district division into which the plant was divided, have not thus far been changed from those used by the Government. Peat is loaded into tram cars holding about a ton and three-quarters and taken along twenty-four inch gauge, Koppel, portable track to a loading platform where it is shoveled into box freight cars. Before any considerable quantity is shipped by the present operators, however, it is the intention to provide a light gasoline locomotive, more convenient dump cars, and a loading device to fill box cars to their capacity without having to shovel the fuel back. This will be taken up the first thing in the spring.

The plant will be operated this fall to provide fuel for next season's opera-

tions, when it is expeeted a full year's output will be obtained, as the plant is now eomplete and in order for continuous operation.

In eonelusion, the success obtained with this plant, eoupled with the successful and profitable operations of Peat Industries, Limited, of Montreal, Quebec, this year, makes possible the statement that peat fuel manufaeture is now eommereially established in Canada. True, the output this year was eomparatively small, little more than last year, but a solid and practical foundation has been laid, and results obtained that are proving satisfaetory to capital, and it is the firm conviction of the writer that in less than five years peat fuel will be extensively made and used in Canada, and more particularly in the Provinees of Ontario and Quebec.

DR. DE LAVAL.

The name of Dr. Carl Gustav Patrick de Laval of Stockholm, Sweden, who died on February 2nd, has for some years past been associated with the peat industry in that country. With Mr. Alf. Larson he had been recently engaged in experimental work on a wet-carbonizing proeess for the treatment of peat. Although no definite information as to results is yet available, the outcome of these experiments has been awaited with mueh interest. In the course of a discussion of Ekelund's peat powder which oecurred at a Technologieal meeting held in Stockholm some months ago, Capt. Wallgren, Chief Engineer of the Swedish Government Peat Investigation, stated that Dr. de Laval's wet-earbonizing method would, in the future, be able to compete with peat powder.

Dr. de Laval, who was born in 1845 at Blosenberg, Sweden, graduated with high honours in engineering from Upsala University in 1872. Failing in a private venture, he became engineer to the Klosterverken Iron Works in 1875. During the late seventies and for some years aftrwards, his time and energy were devoted to the perfecting of the ercam separators which have made his name known the world over. Following the many clever inventions he worked out in eonnection with eentrifugal separators, came his highly ingenious form of steam turbine, and numerous other innovations in the application of mechanieal principles, some of whieh have already been fertile in practical results. Dr. de Laval was interested in several important industrial eoneerns in Sweden. He was a member of the Swedish House of Representatives, and had been awarded many home and foreign orders and distinctions.

INVESTIGATION OF THE PEAT BOGS AND PEAT INDUSTRY OF CANADA, 1910, 1911.

By A. Anrep.

(Bulletin No. 8—Department of Mines, Mines Branch).

Part I. contains a report on the manufacture of Peat Fuel at the Government peat bog, Alfred, Ont., in 1910. Also table shewing analyses of peat samples collected in Ontario. (vide page 20 of this number).

Appliances for the manufacturing of peat fuel are reported upon, as follows:

The Lincoln excavating system at Farnham, Que.

Dr. Wielandt's combined excavating and spreading machine.

The Ekenberg wet-carbonizing process.

The Anrep excavating system.

Mechanical extraction of moisture from peat, by "Doering Consortium", Moscow, Russia.

PEAT PAPER.

Translation of an article on the microscopical investigation of peat paper samples, by Emil Haglund, from Svenska Mosskulturforeningens Tidskrift.

PEAT POWDER.

I.—Description and detailed particulars of the peat powder manufacturing plant at Back, Smaland, Sweden, by E. Nystrom, Jernkontorets Peat Engineer.

II.—A report on the manufacture of peat and peat powder at the Back Peat Bog by means of the Ekelund system, by Captain Ernest Wallgren, Chief Engineer, Swedish Government peat investigation.

III.—Note on the operation of the Munktell-Ekelund excavator on the Back peat bog.

IV.—Report of discussion on peat powder at Stockholm.

V.—Extracts from Swedish newspaper on peat powder manufacture.

Records of machine peat manufactured in Sweden, 1909, and in Denmark, 1910.

Part II. gives details of investigation of the Holland, Coney Island, Crozier, and Fort Francis peat bogs, Ontario, and of the Lac du Bonnet, Transmission, Corduroy, Boggy Creek, Rice Lake, Mud Lake, Litter and Julius peat bogs, Manitoba. (vide pp. 14-17 of this number).

Also of preliminary investigations of the Whitemouth, Plum, Netley, Clandeboye, Big Grass, Douglas, McCreary, Ochre River and Dauphin marshes in Manitoba.

(Copies of Bulletin 8 may be had by addressing application for same to Dr. Eugene Haanel, Director of Mines, Ottawa, Canada).

MANITOBA PEAT BOGS

(The following descriptions are condensed from those in Bulletin 8, Mines Branch, Department of Mines, Canada.—"Investigation of the Peat Bogs and Peat Industry of Canada, 1910-11, by A. Anrep.")

LAC DU BONNET BOG.

Location:—60 miles east of Winnipeg, and 4 miles west of Lac du Bonnet.

Area:—249 acres.

Depth and cubical contents:—

180 acres less than 5 ft. deep, ave. 2½ ft., 701,800 cub. yds.

69 acres 5 to 10 ft. deep, 556,600 cub. yd.

Estimated production:—

59,371 tons peat fuel, with 25% moisture.

Analysis of peat, dry:—

Fixed Carbon	25.0 per cent.
Volatile matter	59.4 per cent.
Ash	15.6 per cent.
Nitrogen	1.4 per cent.
Phosphorus	0.069 per cent.
Carbon-hydrogen ratio	0.42 per cent.

Character of bog:—

Principally formed by sphagnum moss, except around the margin. In some parts there are stumps and trunks.

General Remarks:—

The peat in the middle part of the bog is fairly well humified, but is of poor quality, on account of the fact that bog had not a great depth and was poorly drained, so that the frost penetrated deep into the bog; hence the peat, in most places has lost its cohesive properties. The area of the middle part of the bog is comparatively small, and since it is cut up by ditches unsystematically laid out, it is not likely that it can be use for the manufacture of machine peat fuel. The peat in the rest of the area around the margin of the bog is very shallow, and heavily overgrown with alder and spruce, intermixed, in some parts, with balsam and young poplar.

By a systematic and thorough drainage of this bog a considerable amount of farming land would be recovered, which at present is practically valueless.

TRANSMISSION PEAT BOG.

Location:—18 miles from Point Dubois.

Area:—1375 acres.

Depth and cubical contents:—

Less than five feet,—10,648,888 cub. yds.

Estimated production:—

936,379 tons peat fuel with 25% moisture.

Analysis of peat, dry:—

Fixed Carbon	24.2	per cent.
Volatile matter	56.8	per cent.
Ash	19.0	per cent.
Nitrogen	1.6	per cent.
Phosphorus	0.047	per cent.
Fuel ratio, fixed carbon—volatile matter	0.43	per cent.

Character:—

Mainly formed by sphagnum moss, intermixed with carex, aquatic plants, leaves, spruce cones and needles, sticks, roots and trunks.

General Remarks:—

This bog is comparatively shallow, and the peat poorly humified and of an inferior quality, hence it can be expected to yield only a very light fuel. It is not likely that this bog can be utilized and turned into machine peat by methods at present known.

CORDUROY PEAT BOG.

Location:—14 miles from Point Dubois.

Area:—100 acres, average depth 4 feet.

Estimated production:—

43,023 tons peat fuel with 25% moisture.

This peat bog is practically valueless.

BOGGY CREEK PEAT BOG.

Location:—12 miles from Point Dubois.

Area:—661 acres.

Depth and cubical contents:—

216 acres less than 5 feet deep	1,372,592 cub. yds.
445 acres 10 feet and more deep	5,021,769 cub.yds.

Estimated production:—

567,607 tons of peat fuel with 25% moisture.

General remarks:—

The bog is well situated as regards transportation facilities, since the middle part is traversed by the City of Winnipeg Construction Railway.

The peat would furnish a fairly good but light fuel. The content of ash is not excessive, and the calorific value about satisfactory.

RICE LAKE PEAT BOG.

Location:—7½ miles from Point Dubois.

The bog has a very small area. The peat is poorly humified, not uniform in quality, and cannot be used for the manufacture of peat fuel.

MUD LAKE PEAT BOG.

Location:—3 miles from Point Dubois.

Area:—

139 acres; average depth, 9 feet, containing 2,011,667 cubic yards.

Estimated production:—

208,617 tons of peat fuel with 25% moisture.

General remarks:—

The peat is fairly well humified and uniform in quality, and can be used for the manufacture of peat on a small scale, but the finished product will be comparatively light.

The bog is advantageously situated as regards shipping facilities, being traversed by the City of Winnipeg Construction Railway.

LITTER PEAT BOG.

Location:—2 miles from Point Dubois, covering 110 acres.

82 acres are best adapted to the production of peat litter, the estimated production being 104,330 tons, with 20% moisture.

The remaining 28 acres are adapted to manufacture of peat fuel, and are estimated to yield 48,173 tons.

This bog is 70 miles from Winnipeg.

JULIUS PEAT LITTER BOG.

Location:—1 mile west of Shelley, Man.

Area:—

996 acres less than 5 feet deep	5,756,091 cub. yds.
1954 acres less than 10 feet deep	21,329.339 cub. yds.
946 acres more than 10 feet deep	17,297,084 cub. yds.

Estimated production:—

2,448,881 tons of peat litter with 20% moisture.

CONEY ISLAND PEAT BOG.

Location:—On Coney Island, Lake of the Woods, one mile from Kenora, Ont.

Area:—25 acres, average depth 8 feet.

Estimated production:—

32,267 tons of peat fuel with 25% moisture.

CROZIER PEAT BOG.

Location:—6 miles from Fort Francis, Ont.

Area:—355 acres, average depth 14 feet.

Estimated production:—

518,291 tons of peat litter with 20% moisture.

FORT FRANCIS PEAT BOG.

Location:—1 mile from Fort Francis, Ont.

Area:—1700 acres.

929 acres less than 5 feet deep	4,995,959 cub. yds.
691 acres less than 10 feet deep	7,803,693 cub. yds.
86 acres more than 10 feet deep	1,433,716 cub. yds.

Estimated production:—

891,205 tons of peat fuel with 25% moisture.

General remarks:—

The bog is very advantageously situated in regard to shipping facilities and market, being only one mile from Fort Francis, and traversed on the south side by the Canadian Northern Railway.

In addition to the above, preliminary investigations are reported as follows:

WHITEMOUTH OR TRANSCONTINENTAL MARSH.

The portion preliminarily investigated covers about 97,000 acres. The total area of the bog is supposed to be 200,800 acres, between Winnipeg River and Whitemouth Lake, and following the Whitemouth River on the east side.

Under present conditions the bog cannot very well be employed for the manufacture of peat fuel, or even peat litter, for the reason that the peat is not sufficiently humified for the former, and too much humified for the latter. If this enormous area were thoroughly drained, the peat in the middle region north of the Canadian Pacific Railway would rapidly humify, and could be utilized for the manufacture of a fairly good peat fuel. Such drainage would involve, under present unsettled conditions of the country, a great expenditure of money; but considering the value of the land that would be recovered for agricultural purposes, land which is at present practically valueless, and taking into account the improvement which would result in the surrounding farming land, consequent upon this drainage, the undertaking would eventually be a paying proposition.

Plum Marsh (90,000 acres), Netley Marsh (25,000 acres), Clandeboye Marsh (27,000 acres), Big Grass Marsh (50,000 acres), the Douglas Peat Bog (13,000 acres), McCreary Marsh, Ochre River or Turtle Marsh (9,000 acres), and the Dauphin Marsh (6.000 acres), are reported as unsuited to the manufacture of peat fuel or peat litter. By draining, however, these extensive areas can be economically recovered, and thus become valuable for use as agricultural land.

Journal of the Canadian Peat Society

Published Quarterly by

THE CANADIAN PEAT SOCIETY

22 Castle Building, Ottawa, Can.

Subscription Price (4 numbers) **$1.00**

Advertising rates will be furnished on application.

Remittances may be made by cheque (payable at par in Ottawa), draft, money order, or postal note to the Secretary-Treasurer of THE CANADIAN PEAT SOCIETY, 22 Castle Building, Ottawa, Can.

EDITORIAL.

The present number begins Vol. II. of the Journal of the Society. No issue having been in November, 1912, all subscriptions which would otherwise have commenced in that month will be continued to the end of 1913.

Since our last issue an important investigation of peat power plants in Europe has been made under the direction of the Mines Branch of the Department of Mines by Mr. B. F. Haanel, assisted by Mr. John Blizard. It is hoped that some information as to the result of this investigation will be available for the next issue of the Journal.

TO MAKE BRIQUETTES FROM LIGNITE.

A proposition for the establishment of a lignite-briquetting plant at the Manitoba-Saskatchewan mines near Estevan was recently made to the Saskatchewan legislature by Senator R. Watson, Sir William White and Sir Daniel McMillan. Their proposal was along the line that their Syndicate and the Government should put up $50,000 each, thus becoming equally interested in the project.

It is stated that the coke briquetting plant proposed to be employed can produce briquettes from lignite coke of the same, or nearly the same, B.T.U. as good anthracite coal at a cost of $3.68 per ton at the mines.

BY-PRODUCTS PROFITABLE.

In addition, it is claimed, there are by-products such as 10,000 cubic feet of gas (part of which returns to the machines and is used for heat) per ton, light oils, pitch, ammoniacal liquor, carbolic oils, creosote oils, etc., which will sell altogether for pretty nearly the cost of producing the briquettes.

The lignite coke briquettes are said to burn with a steady, low flame, with practically no smoke, no gas, and no odor. The briquettes retain their shape until thoroughly burned out, and there are no clinkers.

The government has retained the inventor for the coming year, so that he can prove to them with a single unit plant that he has a solution of the problem of using lignite coal advantageously.

PEAT AND WOOD WASTE FOR PULP

Wilhelm Hellwig, a German paper maker, and F. Hermann, manufacturer, have been granted a patent (G.B.) for an approved process for rendering peat, wood waste and other vegetable substances suitable for manufacturing paper pulp. The material is placed in a warm solution of chloride of lime, dilute hydrochloric acid, and potash of soda, and allowed to remain for some time. After this the mass is boiled in lime water. One example is: 10 kilograms of 90 per cent. calcined soda dissolved in 100 litres boiling water, is boiled for a time, stirring at intervals. Two kilograms of chloride of lime are added in the form of paste. When the mixture is cool there is added 3 kilograms of hydrochloride acid of about 20 degrees Be. Material placed in this liquor is left for twenty-four hours (the liquor being, preferably, warmed). The material is then removed and put into boiling water into which has been introduced 5 per cent. of burned lime. In this the material is boiled for about two hours, after which it is removed, and washed in clean cold water. The resulting mass is ready for further treatment in the ordinary way. (Pulp and Paper Magazine, Jan. 15, 1913)

The Following Table Shows the Analyses from the Different Peat Samples Collected in Ontario.

No. of Samples from each Bog	Peat from	Composition of Peat.	ANALYSES OF PEAT (absolutely dry). Volatile matter	Fixed carbon	Ash	Phosphorus	Sulphur	Nitrogen	Calorific value, B.T.U. per lb.
1	Mer-Bleu, Ontario	Sphagnum more or less mixed	65.90	24.22	10.88	--------	--------	--------	8821
2	" "	with eriophorum	67.57	25.35	7.18	0.026	0.314	1.40	9021
3	" "		68.40	25.00	6.60	--------	--------	--------	
4	" "		63.22	24.86	11.92	--------	--------	--------	8805
5	" "		68.76	25.73	5.51	--------	--------	--------	9126
6	" "		68.73	26.27	5.00	0.024	0.317	1.13	9441
7	" "		69.49	26.04	4.47	--------	--------	--------	9301
1	Alfred, Ontario	Principally formed by sphagnum	68.13	26.56	5.31	0.029	0.292	1.23	8730
2	" "		68.72	24.22	7.06	0.022	0.375	1.92	9058
1	Welland, Ontario	Sphagnum mixed with carex,	67.14	26.48	6.38	0.027	0.317	1.13	9118
2	" "	eriophorum, and hypnum	70.90	24.84	4.26	0.024	0.248	1.74	8596
3	" "		70.53	24.28	5.19	--------	--------	--------	8667
1	Newington, Ontario	Sphagnum slightly mixed with	66.75	25.77	7.48	0.028	0.530	1.85	8721
2	" "	aquatic plants.	67.07	26.27	6.66	0.030	0.494	1.80	8465
3	" "		68.84	26.65	4.51	--------	--------	--------	8877
4	" "		71.32	24.44	4.24	0.032	0.345	1.63	8336
5	" "		69.54	26.75	3.71	--------	--------	--------	9102
6	" "		65.77	27.30	6.93	--------	--------	--------	8210
·7	" "		66.97	26.70	6.33	--------	--------	--------	8312
1	Perth, Ontario	Sphagnum mixed with hypnum.	70.34	25.35	4.31	0.030	0.405	1.66	9067
2	" "		71.51	24.60	3.89	0.027	0.334	1.94	9148
1	Victoria Road, Ontario	Hypnum mixed with sphagnum.	69.52	25.18	5.30	--------	--------	--------	8649
1	Brunner, Ontario	Principally hypnum	64.09	25.16	10.75	1.73	0.303	0.035	8850
1	Komoka, Ontario	Sphagnum mixed with carex	60.90	18.52	20.58	1.63	1.34	0.087	7490
1	Brockville, Ontario	Carex slightly mixed with eriophorum and aquatic plants.	66.70	21.75	11.75	2.41	0.90	0.038	8173
1	Rondeau, Ontario	Carex mixed with remains of grasses and aquatic plants.	61.00	22.90	16.10	2.77	0.73	0.049	7914
1	Alfred, Ontario: part of bog	Sphagnum slightly mixed with hypnum and eriophorum.	68.23	26.00	5.77	1.76	0.218	0.033	9005

*From Bulletin 8, Department of Mines, Mines Branch.

Peat Bogs Investigated in Manitoba during the year 1911

The names of the peat bogs.	Locality		Approximate total area.	Volume of workable Peat.			Partial analyses of absolutely dry Peat				Remarks.
	Townships	Range		Tons of fuel with contents 25 p.c moisture	Tons of litter with contents 20 p.c. moisture	Cubic yards	Fixed carbon	Volatile matter	Ash	Calorific value	
Lac du Bonnet	14	10 E	249	59,371	-------	445,280	25.0	59.4	15.6	-------	Principally formed by sphagnum
Transmission	15	12 E	1,375	936,379	-------	7,022,840	24.2	56.8	19.0	-------	Principally formed by sphagnum and carex
Corduroy	15	12 E	100	43,023	-------	322,666	9.1	34.8	56.1	-------	Principally formed by sphagnum and aquatic plants.
Boggy Creek	15	12-13 E	661	567,607	-------	4,257,049	26.7	65.0	8.3	8730	Principally formed by carex
Rice Lake	15	13 E									
Mud Lake	15	14 E	139	208,617	-------	1,564,629	23.2	69.1	7.7	8760	Principally formed by sphagnum
Litter (Peat Litter)	15	14 E	82	-------	104,230	1,389,739	-------	-------	-------	-------	Principally formed by sphagnum and carex
Litter (Peat fuel)	15	14 E	28	48,173	-------	361,387	-------	-------	-------	-------	Principally formed by sphagnum
Julius	11-12	10 E	3,896	-------	2,448,880	32,651,756	-------	-------	-------	-------	Principally formed by sphagnum
		Total	6,530	1,863,170	2,553,110	48,015,346					

*From Bulletin 8, Department of Mines, Mines Branch.

RETAIL PRICES OF FUEL IN CANADA.

The following tables set forth the retail prices prevailing on, or about, the fifteenth of each month from May, 1910, to December, 1912, inclusive, of coal and wood in the leading centres of industry throughout Canada.

The list of localities includes nearly every place having a population of 10,000 people, and is representative of every Province in the Dominion.

The quotations were furnished to the Department of Labour by the correspondents of the Labour Gazette in the respective localities, under detailed instructions from the Department as to sources of information, quality of goods to be quoted, etc., and have been compiled from the tables of Retail Prices of Staple Articles of Consumption, published monthly in the Labour Gazette.

The prices quoted are per ton of 2,000 lbs. of coal, and per cord of wood.

Abbreviations:—H.C.—Hard Coal (Anthracite).
S.C.—Soft Coal, (bituminous, in some cases in the Western Provinces, lignite)
H.W.—Hard Wood.
S.W.—Soft wood.

RETAIL PRICES OF FUEL IN CANADA.

	SYDNEY, N.S.				WESTVILLE, N.S.				AMHERST, N.S.				HALIFAX, N.S.			
	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
1910																
May	7.50	3.00	4.00	—	—	3.20	—	—	6.50	4.75	5.00	3.75	7.00	5.00-5.25	5.50	3.50
June	"	"	"	—	—	"	—	—	6.20	"	"	4.00	6.60	4.75-5.00	"	"
July	"	"	"	—	—	"	3.50-4.00	—	6.50	4.60	"	"	6.70	"	"	"
August	"	3.20	"	—	—	"	"	—	6.20	4.70	"	"	6.80	"	"	"
September	"	3.00	"	—	—	"	"	—	6.50	4.75	"	"	7.00	6.00	8.00	7.00
October	"	"	"	—	—	"	"	—	"	4.65	"	"	"	5.00-5.25	5.50	3.50
November	"	"	"	—	—	"	"	—	"	4.75	"	"	"	"	"	"
December	"	"	"	—	—	"	"	—	"	"	"	"	"	"	"	"
1911																
January	"	3.50	6.50	3.50	7.50	5.50	5.50	3.50	"	"	"	"	"	"	"	"
February	"	"	"	"	—	3.20	3.50-4.00	—	"	4.60	"	"	"	"	"	"
March	6.50	"	4.50	"	—	"	"	—	"	4.75	"	"	"	"	"	"
April	"	"	"	"	—	"	"	—	"	4.70	"	"	"	"	"	"
May	"	"	"	"	—	"	"	—	"	"	"	"	"	"	"	"
June	"	"	"	"	—	"	"	—	6.75	"	"	3.50	6.80	4.75-5.00	"	"
July	"	"	"	"	—	"	"	—	—	4.60-4.75	"	4.00	6.90	"	"	"
August	"	"	"	"	—	"	"	—	—	—	"	"	7.00	"	"	"
September	"	"	"	"	—	"	"	—	6.75	4.70	"	"	7.10	5.00-5.25	"	"
October	"	"	"	"	—	"	"	—	6.50	"	"	"	7.20	"	"	"
November	"	"	"	"	—	"	"	—	6.75	"	"	"	"	"	"	"
December	"	"	"	"	—	"	"	—	"	4.60	"	"	7.25-7.50	"	"	"
1912																
January	"	"	"	"	—	"	"	—	—	—	"	"	7.50	"	5.00	"
February	8.00	"	4.00	2.50	—	"	"	—	7.25	4.60	"	"	"	"	5.50	"
March	"	"	"	"	—	"	4.00	3.50	"	"	"	"	7.75	5.25-5.50	"	"
April	—	"	"	"	—	"	"	"	"	"	"	"	9.00	"	"	"
May	—	"	"	"	—	"	"	"	"	"	"	"	8.00	"	"	"
June	—	"	"	"	—	"	"	"	"	"	"	"	7.00-7.25	5.00-5.25	"	3.00
July	—	"	"	"	—	"	"	"	"	"	"	"	7.25	5.25	"	3.50
August	7.25	"	"	"	—	"	"	"	"	"	"	"	7.50	5.25	"	"
September	"	"	"	"	—	"	"	"	"	"	"	"	7.75	5.50	"	"
October	"	"	"	"	—	"	"	"	8.50	4.75	"	"	8.50	"	"	"
November	8.00	"	"	"	—	"	"	"	10.50	"	"	"	9.00	5.75	"	"
December	"	"	"	"	—	"	"	"	"	"	"	"	"	"	"	"

	CHARLOTTETOWN, P.E.I.				MONCTON, N.B.				ST. JOHN, N.B.				FREDERICTON, N.B.			
1910	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
May	6.50	4.00	—	—	7.25	5.50	4.50	3.50	6.50-6.75	4.85-5.50	8.00-9.00	4.00	—	—	—	—
June	"	"	—	—	6.25	"	"	3.25	6.75-7.00	"	"	"	—	—	—	—
July	"	"	—	—	6.50	"	"	"	"	"	"	"	—	—	—	—
August	"	"	—	—	6.35	"	"	"	"	"	"	"	—	—	—	—
September	5.85	3.90	—	—	"	"	"	"	"	"	"	"	—	—	—	—
October	6.50	—	—	—	6.50	"	"	3.50	6.50-7.00	5.10	"	"	—	—	—	—
November	"	4.00	—	—	6.75	5.25	"	3.25	"	"	"	"	—	—	—	—
December	"	"	—	—	"	"	"	"	"	"	"	"	—	—	—	—
1911																
January	"	"	—	—	7.00	"	"	"	"	"	"	"	—	—	—	—
February	"	"	—	—	7.00-7.50	"	"	"	"	"	"	"	—	—	—	—
March	"	"	—	—	"	"	"	"	"	"	"	"	—	—	—	—
April	"	4.50	—	—	7.25	"	5.00	3.50	"	"	"	"	—	—	—	—
May	"	4.00	—	—	7.50	"	"	"	"	"	"	"	—	—	—	—
June	"	"	—	—	7.25	"	"	"	"	"	"	"	—	—	—	—
July	"	"	—	—	6.50	"	"	"	"	"	"	"	—	—	—	—
August	"	"	—	—	"	"	"	"	"	5.00	"	"	7.25	6.25	5.00	4.00
September	"	"	—	—	"	"	"	"	"	5.10	"	"	6.75	6.00	"	"
October	"	"	—	—	6.75	"	"	"	7.00-7.75	"	"	"	—	—	—	—
November	"	"	—	—	7.00	"	"	"	"	"	"	"	—	—	—	—
December	"	"	—	—	7.50	"	"	"	"	"	"	"	—	—	—	—
1912																
January	"	"	—	—	8.00	"	"	"	"	"	"	"	6.75	6.50	6.50	4.00
February	"	"	—	—	8.25	"	5.25	"	"	"	"	"	8.00	"	"	"
March	—	—	—	—	8.75	"	"	"	7.50-8.00	"	"	"	"	"	"	"
April	—	—	—	—	—	"	"	"	"	"	"	"	"	"	"	"
May	—	—	—	—	—	"	"	"	7.50	"	"	"	"	"	"	"
June	—	—	—	—	—	"	"	"	"	"	"	"	7.50	6.50	"	"
July	6.50	4.25	—	—	—	"	"	"	"	"	"	"	"	"	"	3.00
August	6.75	"	—	—	7.50	"	5.50	"	"	"	"	"	8.50	6.50	"	"
September	"	"	—	—	7.75	"	"	"	"	"	"	"	"	"	"	"
October	7.00	4.50	—	—	8.00	"	"	"	9.00	5.70-6.00	"	"	9.00	"	"	"
November	"	"	—	—	—	"	"	"	8.75	5.10	"	"	"	"	"	"
December	"	"	—	—	—	"	"	"	"	"	"	"	"	"	"	4.00

RETAIL PRICES OF FUEL IN CANADA—*Continued.*

	NEWCASTLE, N.B.				QUEBEC, QUE.				THREE RIVERS, QUE.				SHERBROOKE, QUE.			
1910	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
May	7.00	5.00	4.00	3.00	7.25	4.75	7.00-8.00	5.00-6.00	6.50	5.00	6.50	4.00	6.80	5.90	4.25-4.50	3.50-4.00
June	6.50	4.50	"	"	"	"	"	"	"	"	"	"	6.90	"	"	"
July	7.00	5.25	"	"	"	"	6.00-7.00	4.50-5.50	"	"	"	"	"	"	"	"
August	"	"	"	"	"	"	5.50-6.50	4.00-5.00	"	"	"	"	7.00	"	"	"
September	"	"	"	"	"	"	6.00-7.00	4.50-5.50	"	"	"	"	7.10	"	4.75-5.00	"
October	"	5.00	"	"	"	"	"	"	6.75	"	"	"	7.50	"	4.25-4.75	"
November	"	"	"	"	"	4.25	"	"	7.00	"	"	"	7.40	4.75	5.00-5.25	4.00
December	"	"	"	"	7.50	5.00	"	"	7.25	"	"	"	7.50	"	5.00	"
1911																
January	7.50	"	"	"	7.50-7.75	5.00-5.50	"	4.50-5.00	"	"	"	"	"	"	"	"
February	"	5.50	"	"	"	"	"	"	"	"	"	"	"	"	"	"
March	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
April	7.25	5.25	"	2.50	"	"	"	4.50-5.50	"	"	"	"	6.80	6.00	"	4.50
May	"	"	"	"	7.25	4.50	"	"	6.50	"	"	"	"	"	"	"
June	7.50	5.50	"	"	"	4.50-5.00	"	"	"	"	"	"	6.90	"	"	"
July	"	"	"	"	"	"	"	"	6.75	"	"	"	7.00	"	"	"
August	"	"	"	"	"	"	"	"	"	"	"	"	7.10	"	"	"
September	"	"	"	"	7.50	4.75-5.75	"	"	"	"	"	"	7.20	"	"	"
October	"	"	"	"	"	"	"	"	"	"	"	"	7.30	"	"	"
November	8.00	5.25	"	"	"	"	"	"	"	"	"	"	7.50	"	"	"
December	"	"	"	"	7.75-8.00	5.00-6.00	"	4.00-5.00	7.00	"	"	"	"	"	"	"
1912																
January	"	"	"	3.00	"	"	"	4.50-5.50	7.50	"	"	"	"	"	"	"
February	9.00	"	4.50	3.50	"	"	"	"	"	"	"	"	"	"	"	"
March	"	"	"	"	9.00	"	"	"	"	"	"	"	"	"	"	"
April	10.00	"	"	"	12.00	"	"	"	"	"	"	"	"	"	"	"
May	—	—	—	—	—	"	"	"	"	"	"	"	"	"	"	"
June	—	—	—	—	8.00	4.50-5.50	"	"	"	"	"	"	7.15	"	"	"
July	—	—	—	—	"	"	"	"	6.90	"	"	"	7.25	"	"	"
August	—	—	—	—	"	4.50-5.00	"	"	"	"	"	"	7.35	"	"	"
September	—	—	—	—	8.25	"	"	"	7.00	"	"	"	7.45	"	"	"
October	—	—	—	—	"	"	"	"	"	"	"	"	7.50	"	"	"
November	—	—	—	—	10.00	5.00-5.50	"	"	7.50	"	"	"	8.50	"	"	"
December	—	—	—	—	10.-12.	"	"	"	"	"	"	"	"	"	"	"

RETAIL PRICES OF FUEL IN CANADA—*Continued.*

	HULL, QUE.				OTTAWA, ONT.				BROCKVILLE, ONT.				KINGSTON, ONT.			
1910	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
May	7.50	5.50	3.50	2.75	7.50	5.50	6.50	3.25	—	—	—	—	7.00	6.25	7.00	4.50
June	7.25	"	5.50	3.50	"	"	"	3.50	—	—	—	—	"	"	"	"
July	"	"	"	—	"	"	"	"	—	—	—	—	"	"	"	"
August	"	"	"	—	"	"	"	"	—	—	—	—	"	"	"	"
September	"	"	"	3.50	"	"	"	"	—	—	—	—	"	"	"	"
October	7.50	"	"	"	"	"	"	"	—	—	—	—	"	"	"	4.15
November	"	"	"	"	"	"	"	3.25-3.75	—	—	—	—	"	"	"	4.50
December	"	"	"	3.00	"	"	"	3.75	—	—	—	—	"	"	"	"
1911																
January	"	"	"	3.50	"	"	"	3.25-3.75	—	—	—	—	"	"	"	"
February	"	"	"	"	"	"	"	3.75	—	—	—	—	"	"	"	"
March	"	"	"	"	"	"	6.00	3.50	—	—	—	—	7.50	"	"	"
April	"	"	"	"	"	"	6.50	3.25	—	—	—	—	7.00	"	"	"
May	"	"	"	"	"	"	"	"	—	—	—	—	"	"	"	"
June	"	"	"	"	"	"	"	"	—	—	—	—	"	"	"	"
July	"	"	"	"	"	"	"	"	—	—	—	—	"	"	"	"
August	"	"	"	"	"	"	"	"	—	—	—	—	"	"	"	"
September	"	"	"	"	"	"	"	"	—	—	—	—	"	"	"	"
October	7.75	"	"	"	"	"	"	"	—	—	—	—	"	"	"	"
November	7.50	"	"	"	"	"	—	—	—	—	—	—	"	"	7.50	"
December	"	"	"	"	"	"	—	—	—	—	—	—	"	"	7.00	"
1912																
January	7.75	"	"	"	"	"	7.00	3.50	7.00	—	5.00	4.00	"	"	7.50	"
February	"	"	"	"	7.75	"	"	"	"	"	"	"	"	"	7.00	"
March	7.75-8.00	5.00	"	4.00	"	"	"	"	"	—	6.00	"	8.00	6.25	"	"
April	7.75	"	"	"	"	"	"	"	"	—	6.50	4.50	7.25	5.50	"	5.00
May	"	"	"	"	"	"	"	"	"	—	6.00	"	"	"	"	"
June	"	"	"	"	"	"	"	"	7.50	5.00	"	"	7.75	"	"	"
July	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
August	7.25	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
September	8.00-8.25	5.25	6.00	"	"	"	"	"	"	"	"	"	"	"	"	"
October	"	"	"	"	8.00	"	"	"	"	"	"	"	"	"	"	"
November	8.00	5.50	"	"	"	"	7.50	4.00	"	"	"	"	"	"	"	"
December	"	"	"	4.50	"	"	"	4.50	"	"	"	"	"	"	"	"

RETAIL PRICES OF FUEL IN CANADA—*Continued.*

	SOREL, QUE.				ST. HYACINTHE, QUE.				ST. JOHNS, QUE.				MONTREAL, QUE.			
1910	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
May	—	—	—	—	7.25	5.25	5.00-7.00	4.00-4.50	6.25	5.00	7.50	6.00	7.00	6.50	8.00	5.00
June	—	—	—	—	6.50	"	5.00-7.50	"	"	"	"	"	—	—	—	—
July	—	—	—	—	"	"	"	"	"	"	"	"	—	—	—	—
August	—	—	—	—	6.75	"	"	"	6.00	"	8.00	"	7.00-7.50	6.75	7.00	5.00
September	—	—	—	—	"	"	"	"	6.25	"	7.50	"	—	—	—	—
October	—	—	—	—	7.00	5.50	"	"	"	"	8.00	"	—	—	—	—
November	6.75	5.25	5.00-6.00	3.50-4.75	7.50	"	"	"	"	"	"	"	—	—	—	—
December	"	5.00	6.25	5.00-5.50	"	"	"	"	6.50	"	"	"	—	—	—	—
1911																
January	"	4.75	6.50	5.25	"	5.00	7.00	5.00	"	"	"	"	7.25	7.00	8.00	5.50
February	"	4.25	"	4.75	7.25	5.25	5.00-7.50	4.50	"	"	"	"	7.00	6.75	"	5.00
March	6.50	4.75	6.25	5.50	7.50	5.00	6.50-7.00	5.00	"	"	"	"	7.25	7.00	"	"
April	6.75	4.50	6.25-6.50	4.25-4.75	"	"	"	"	"	"	"	"	"	6.75	"	6.00
May	"	"	"	4.50	"	"	"	"	6.00	"	"	"	7.50	"	"	"
June	"	"	"	4.75	"	"	"	"	6.25	"	"	"	"	"	"	"
July	6.25	"	"	4.25	7.70	"	"	"	6.50	"	"	"	"	7.00	"	"
August	6.75	"	"	"	6.75	"	"	4.50-5.00	"	"	"	"	"	"	"	"
September	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
October	"	4.75	"	4.50	"	"	"	"	"	"	"	"	"	"	"	"
November	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
December	"	"	"	"	"	"	"	"	"	"	"	"	7.75	"	"	"
1912																
January	6.50-6.75	5.00	6.50	4.00	7.50	"	"	"	"	"	—	—	"	6.50	"	4.50
February	"	"	"	"	"	"	"	"	7.00	6.00	6.00	4.00	"	"	"	"
March	7.00	"	"	"	9.00	"	5.50-7.00	"	8.00	"	"	5.00	7.75-9.00	"	"	"
April	"	"	"	"	7.50	"	"	"	8.50	"	6.50	"	8.00-9.50	"	"	"
May	"	"	"	"	8.00	"	"	"	"	"	"	"	7.75	"	8.35	4.85
June	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
July	"	"	"	"	"	5.50	"	"	6.60	5.00	6.00	4.50	"	"	"	"
August	"	"	"	"	"	5.00	"	"	7.00	5.50	"	"	7.50	"	"	"
September	7.50	"	"	"	7.50	5.50	"	"	7.25	5.75	"	"	8.25	"	"	"
October	8.00	"	7.00	5.00	"	"	"	"	7.75-8.50	6.00	6.50	5.00	9.50-10	"	"	"
November	"	"	"	"	"	"	"	"	7.75	"	"	"	8.50-10	"	"	"
December	"	"	"	"	10.50	7.00	"	"	8.25	6.50	"	"	"	"	"	"

	BELLEVILLE, ONT.				PETERBOROUGH, ONT.				TORONTO, ONT.				NIAGARA FALLS, ONT.			
1910	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
May	6.75	5.00	6.00	—	7.00	5.50	6.00	2.75	6.50	5.00	7.50	6.50	6.25	4.00	7.00	5.00
June	"	"	"	—	7.10	"	"	"	"	"	"	"	"	"	"	"
July	"	"	"	—	7.20	"	"	"	"	"	"	5.00	"	"	"	"
August	"	"	7.00	—	7.30	"	'	"	6.75	"	"	"	"	"	"	"
September	—	—	6.50	4.50	7.40	"	"	3.00	"	"	"	"	6.00	"	"	4.00
October	—	—	—	—	7.50	"	"	"	7.00	5.00-6.00	7.50-8.00	5.50	"	"	"	5.00
November	7.00	5.00	—	—	"	"	"	"	"	5.50	"	5.00	"	"	"	"
December	—	—	—	—	"	"	5.50	"	"	"	"	"	"	"	"	"
1911																
January	—	—	—	—	"	"	6.00	3.50	7.50	6.00	"	"	"	"	"	"
February	—	—	—	—	"	"	"	"	"	"	"	"	"	"	"	"
March	—	—	—	—	"	"	"	"	"	"	"	"	"	"	"	"
April	—	—	—	—	"	"	"	"	"	"	7.50	"	"	"	"	"
May	—	—	—	—	7.00-7.25	"	"	"	6.75	5.00	"	"	"	"	"	"
June	—	—	—	—	7.10	"	"	"	"	"	"	"	"	"	"	"
July	—	—	—	—	7.20	"	"	"	6.75-7.00	"	"	"	"	"	"	"
August	7.00	5.50	7.00	5.00	7.30-7.55	"	"	"	"	"	"	"	6.25	4.50	"	"
September	6.75	5.00	"	5.50	7.40	"	"	"	7.00-7.25	"	"	"	"	"	"	"
October	7.00	5.50	"	5.00	7.50-7.75	"	"	"	"	"	"	"	"	"	"	"
November	—	—	—	—	"	6.00	"	"	"	"	"	"	"	"	"	"
December	7.25	5.25	7.00	5.00	"	5.50	"	"	7.25-7.50	"	8.50	5.50	"	"	"	"
1912																
January	7.00	4.95	6.75	"	"	"	"	"	"	"	"	"	"	"	"	"
February	7.25	6.75	5.00-6.00	—	"	"	"	"	"	"	"	"	"	"	"	"
March	7.50	—	6.00	5.00-5.50	"	"	7.00	"	"	"	"	"	"	"	"	"
April	7.25	4.75	7.00	5.00	"	"	"	"	"	"	"	"	"	"	"	"
May	7.00	"	"	"	"	"	"	3.00	7.25	"	"	"	"	"	"	"
June	"	"	"	"	"	"	"	3.50	7.25-7.50	5.50	"	"	"	"	"	"
July	7.25	5.00-5.50	6.50	4.50-5.00	7.60-7.85	"	"	"	"	"	"	"	6.50	4.75	"	"
August	7.50	"	"	"	7.70-7.95	"	"	"	7.50-7.75	"	"	"	"	"	"	"
September	"	"	"	"	7.80	"	"	"	8.00	"	"	"	6.75	5.00	"	"
October	8.00	"	"	"	8.25	"	"	"	"	"	"	"	"	"	"	"
November	8.50	"	"	"	"	"	"	"	8.25	"	"	"	7.00	"	"	"
December	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"

RETAIL PRICES OF FUEL IN CANADA—*Continued.*

	ST. CATHERINES, ONT.				HAMILTON, ONT.				BRANTFORD, ONT.				GUELPH, ONT.			
	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
1910																
May	7.00	—	8.00	5.00-6.00	6.75	5.50	7.00	5.50	6.75	5.00	8.00	5.00	6.50	4.50	8.00	6.50
June	"	—	"	"	"	"	"	"	"	"	"	"	"	"	"	"
July	"	—	"	5.00	"	"	"	"	"	"	"	"	"	5.00	"	5.50
August	6.50	—	"	5.00-6.00	"	"	"	"	"	"	"	"	"	"	"	"
September	"	—	"	6.00	"	"	"	"	7.00	"	"	"	6.75	"	"	"
October	6.75	—	"	"	"	"	"	"	"	"	"	"	"	"	"	"
November	"	—	"	"	"	"	"	"	"	"	"	"	7.00	5.50	"	"
December	"	—	"	"	7.00	5.75	7.25	5.75	7.25	"	"	"	"	"	"	"
1911																
January	7.00	—	"	"	"	"	7.50	"	"	"	"	"	"	"	"	"
February	"	—	"	"	"	"	—	—	"	"	"	"	7.25	"	"	"
March	"	—	"	"	"	"	7.25	5.75	"	"	"	"	"	5.00	"	5.00
April	"	—	"	5.50-6.00	"	5.50-6.00	8.00	6.00	"	"	"	"	6.75	5.50	"	"
May	"	—	"	"	6.75	5.25-5.75	"	"	7.00	"	"	"	"	5.00	"	"
June	"	—	"	5.00-6.00	"	"	"	"	"	"	"	"	6.50	"	"	"
July	6.50	—	"	"	"	"	"	"	"	"	"	"	6.75	"	"	"
August	6.75	—	"	"	"	"	"	"	"	"	"	"	"	"	"	"
September	"	—	"	"	7.00	"	"	"	7.25	"	"	"	7.00	"	"	"
October	"	—	"	"	"	"	"	"	"	"	"	"	7.25	"	"	"
November	7.00	—	"	"	"	"	"	"	"	"	"	"	"	"	"	"
December	"	—	"		"	"	"	"	"	"	"	"	"	"	"	"
1912																
January	"	—	"	"	"	"	"	"	"	"	"	"	"	"	"	"
February	"	—	"	"	"	"	"	"	"	"	"	"	"	"	"	"
March	"	—	"	6.00	"	"	"	"	"	"	"	"	"	"	"	"
April	—	—	—	—	"	"	"	"	"	"	"	"	"	"	"	"
May	7.50	—	7.00	5.00	"	"	"	"	"	"	"	"	"	"	"	"
June	—	—	8.00	6.00	7.25	"	"	"	"	"	"	"	"	"	"	"
July	7.00	5.00	8.50	7.50	"	"	"	"	"	"	"	"	"	"	"	"
August	"	"	"	"	"	"	"	"	7.50	"	"	"	7.50	"	"	"
September	"	4.75	"	"	7.50	"	"	"	7.75	"	"	"	"	"	"	"
October	7.25	"	"	"	8.00	"	9.00	7.00	8.25	"	"	"	7.75	5.50	"	"
November	7.50-7.75	4.75-5.00	"	"	"	6.00	"	"	8.00	5.75	"	6.50	8.00	"	"	"
December	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"

RETAIL PRICES OF FUEL IN CANADA—*Continued.*

	BERLIN, ONT.				WOODSTOCK, ONT.				STRATFORD, ONT.				LONDON, ONT.			
	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
1910																
May	6.75	4.50	8.00	5.00	6.50	5.00	7.50	6.00	6.50	6.50	8.50	7.00	6.50	6.50	8.00	6.00
June	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
July	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
August	"	"	"	"	6.25	4.00	"	"	"	"	"	7.50	6.75	"	"	"
September	"	"	"	"	"	4.50	"	"	"	"	"	7.00	7.00	"	"	"
October	"	"	"	"	6.75	4.00-4.50	"	"	7.00	6.00	"	"	"	"	"	"
November	"	"	"	"	"	4.50	"	"	"	"	"	"	"	"	"	"
December	7.25	5.00	"	"	6.00	"	"	"	"	"	"	"	"	6.00	"	"
1911																
January	7.25-7.50	"	"	"	7.00	"	"	"	"	"	"	"	7.00-7.50	"	"	"
February	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
March	"	"	"	"	7.00-7.25	"	"	"	"	"	"	"	"	"	"	"
April	"	"	"	"	7.25	"	"	"	"	"	"	"	6.00-7.50	"	"	"
May	6.75-7.00	"	"	"	"	"	"	"	"	"	"	"	6.75-7.00	"	"	5.50-6.00
June	"	"	"	"	7.00	"	"	"	"	"	"	"	"	"	"	"
July	"	"	"	"	"	"	"	"	6.50	"	"	"	7.00	"	"	"
August	7.00-7.25	"	"	"	"	"	8.00	"	"	"	"	"	6.75-7.00	"	"	"
September	7.50	"	"	"	"	"	"	"	"	6.50	"	"	7.25-7.50	"	"	6.00
October	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
November	"	"	"	"	7.00-7.25	"	"	"	"	"	"	"	"	"	"	"
December	"	"	"	"	7.25	"	"	"	7.00	7.00	"	"	"	"	"	"
1912																
January	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
February	"	4.50	"	"	"	"	"	"	"	"	"	"	"	"	"	"
March	"	"	"	"	"	5.00	"	"	"	"	"	"	"	"	"	"
April	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
May	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
June	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
July	"	"	"	"	7.50	"	"	"	"	"	"	"	"	"	"	"
August	"	5.00	"	"	"	"	8.50	"	"	"	"	6.00-7.00	"	"	"	"
September	"	"	"	"	"	"	"	"	7.75	7.75	"	"	7.50-7.75	6.50	"	"
October	8.00	6.00	8.50	5.50	8.00	"	"	"	8.00	8.00	"	"	7.50	"	"	"
November	"	"	"	"	"	"	"	"	"	"	"	"	7.50-8.00	"	"	"
December	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"

RETAIL PRICES OF FUEL IN CANADA—*Continued.*

	ST. THOMAS, ONT.				CHATHAM, ONT.				WINDSOR, ONT.				ORILLIA, ONT.			
	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
1910																
May	7.00	6.00	6.50	2.75	7.00	5.00	5.00	3.50-4.00	7.50	5.00	8.00	4.50	—	—	—	—
June	"	"	"	"	"	"	"	4.00	"	"	"	"	—	—	—	—
July	"	"	"	"	"	"	4.75	3.50	"	"	"	"	—	—	—	—
August	"	"	"	"	"	"	4.50-5.00	3.00	"	"	"	"	—	—	—	—
September	"	"	8.00	7.00	"	"	"	—	"	5.50	"	"	—	—	—	—
October	"	"	6.50	5.50	"	"	—	—	"	5.00	"	"	—	—	—	—
November	"	"	6.00	4.00	"	"	5.00	4.00	"	"	"	"	—	—	—	—
December	7.25	"	"	"	7.25	"	4.50-5.00	3.50	"	"	"	"	—	—	—	—
1911																
January	"	"	6.50	3.50	"	"	"	3.00-3.50	"	"	"	"	—	—	—	—
February	"	"	6.00	"	"	"	5.00	4.00-4.50	"	"	"	"	—	—	—	—
March	"	"	"	"	"	"	—	—	"	"	"	"	—	—	—	—
April	"	"	"	"	"	"	—	—	"	"	—	"	—	—	—	—
May	"	"	"	"	"	"	—	—	"	"	8.00	4.00	—	—	—	—
June	"	"	"	"	"	"	—	—	"	"	"	4.50	—	—	—	—
July	"	"	"	"	"	"	—	—	"	"	"	"	—	—	—	—
August	"	"	"	"	"	"	—	—	"	"	"	"	—	—	—	—
September	"	"	"	"	"	"	—	—	"	"	"	"	—	—	—	—
October	"	"	"	"	"	"	—	—	7.75	"	"	"	—	—	—	
November	"	"	"	"	"	"	—	—	"	4.50	"	5.00	—	—	—	—
December	"	"	"	"	"	"	5.00	—	"	5.00	"	"	—	—	—	—
1912																
January	"	"	"	"	"	"	—	—	"	"	"	4.50	7.50	5.50	6.00	3.50
February	"	"	"	"	"	"	—	—	"	"	"	5.00	"	"	"	"
March	"	"	"	"	"	"	—	—	"	"	"	"	"	"	"	"
April	"	"	"	"	"	"	—	—	"	"	"	"	"	"	"	"
May	"	"	"	"	"	"	—	—	"	"	"	"	"	"	"	3.75
June	7.50	"	"	"	"	"	—	—	"	"	"	"	7.50-7.75	"	"	"
July	"	"	"	"	"	"	5.00	—	"	"	"	"	7.65	"	"	4.50
August	"	"	"	"	"	"	—	—	"	"	"	"	7.80	"	"	"
September	"	"	"	"	7.50	"	—	—	"	"	"	"	8.00	"	"	"
October	"	"	"	"	7.75	5.25	—	—	8.00	"	"	"	"	"	"	"
November	8.00	"	"	"	9.00	"	—	—	"	"	"	"	7.75-8 00	"	7.00	"
December	"	"	"	"	"	"	—	—	"	"	"	"	8.75	6.00	7.50	5.50

RETAIL PRICES OF FUEL IN CANADA—*Continued.*

	OWEN SOUND, ONT.				COBALT, ONT.				SAULT STE. MARIE, ONT.				PORT ARTHUR, ONT.			
	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
1910																
May	—	—	—	—	—	—	—	—	7.50	5.50	5.50	4.50	8.75	6.00	4.00-6.00	—
June	—	—	—	—	—	—	—	—	"	"	"	"	"	"	"	—
July	—	—	—	—	—	—	—	—	"	"	"	"	7.55	6.50	15.0-6.00	3.00-4.50
August	—	—	—	—	—	—	—	—	8.00	"	6.00	5.00	"	"	"	3.50-4.50
September	—	—	—	—	—	—	—	—	"	"	"	4.00	"	"	"	"
October	—	—	—	—	—	—	—	—	"	"	"	5.00	8.00	6.00	6.00	4.00
November	—	—	—	—	—	—	—	—	"	"	"	"	"	"	5.00-6.00	3.50-4.50
December	—	—	—	—	—	—	—	—	"	"	"	4.00	"	6.50	"	3.00-4.00
1911																
January	—	—	—	—	—	—	—	—	"	"	"	"	—	—	—	—
February	—	—	—	—	—	—	—	—	"	"	"	"	—	—	—	—
March	—	—	—	—	—	—	—	—	"	"	"	"	8.00	6.50	5.00-6.00	3.50-4.50
April	—	—	—	—	—	—	—	—	"	"	"	5.00	"	"	6.00	"
May	—	—	—	—	—	—	—	—	"	"	"	4.50	7.60	5.40	5.00-6.50	"
June	—	—	—	—	—	—	—	—	"	"	"	"	"	"	"	"
July	—	—	—	—	—	—	—	—	"	"	5.50	"	"	"	"	"
August	—	—	—	—	—	—	—	—	"	"	6.00	5.00	"	"	"	"
September	—	—	—	—	—	—	—	—	"	"	"	4.50	"	"	"	"
October	—	—	—	—	—	—	—	—	"	"	"	5.00	8.00	6.00	"	"
November	—	—	—	—	—	—	—	—	"	"	"	"	8.50	"	"	"
December	—	—	—	—	—	—	—	—	"	"	"	"	8.00	"	"	"
1912																
January	6.25	4.00	—	—	9.50	—	5.50	5.00	8.25	"	5.60-6.00	"	—	—	—	—
February	7.25-7.75	5.00-6.00	6.00	3.00	"	—	"	"	—	—	—	—	7.50	5.50	6.00-6.50	4.00-5.00
March	"	"	"	"	10.00	—	"	"	—	—	—	—	8.00	"	5.00-6.00	"
April	7.75	6.00	"	4.50	"	—	"	"	—	—	—	—	"	"	6.00-6.50	"
May	"	"	"	"	"	—	"	6.00	—	—	—	—	7.75	"	5.75-6.00	"
June	"	"	"	"	"	—	"	5.00	—	—	—	—	7.75-8.00	5.00	"	"
July	7.50	"	"	4.00	"	—	"	"	8.50	—	5.50	4.00	"	"	"	"
August	"	"	"	"	9.50	—	"	"	7.50	—	"	4.25	8.25-8.50	5.50	"	"
September	8.00	"	6.50	3.50	10.00	—	"	4.50	"	—	"	4.00	8.50	5.75	5.50-6.00	3.50-4.50
October	"	"	6.00	3.95	"	—	"	"	8.50	—	5.00	"	"	"	"	"
November	9.00	"	6.50	3.75	12.00	—	5.00	4.00	8.00	—	5.50	"	"	"	"	"
December	"	"	7.00	"	11.00	—	"	"	9.00	—	"	"	"	"	"	"

Vol. 2 MAY, 1913 No. 2

JOURNAL

OF THE

CANADIAN PEAT SOCIETY

Published Quarterly by the Society
Subscription Price - $1 per annum
Single Number - Twenty-five cents

CANADIAN PEAT SOCIETY
Room 22, Castle Building Ottawa, Canada

TABLE OF CONTENTS

Journal of the Canadian Peat Society

Vol. 2 MAY, 1913 No. 2

ECONOMIC ASPECT OF THE PEAT INDUSTRY.

Ernest V. Moore, B.Sc. in paper read before the American Peat Society.

The fuel problem in Canada is a question of national concern. To those who have studied the subject, it has a very serious side to it beyond the advancing price of coal. If, for any reason the export of coal from the United States should be restricted, or worse, prohibited, the result to Canada would be alarming indeed. Nearly every industry would be tied up, and widespread suffering result. This is not a remote possibility; no less an authority than Mr. George Otis Smith, of the United States Geological Survey, in his report, advocates the prohibition of the export of coal from the United States in the following words: "Let us keep our coal at home, and with it, manufacture whatever the world needs."

Aside from the foregoing take the economic aspect of the question. Last year, 1911, 4,020,577 tons of anthracite coal were imported at a declared value of $18,794,192.00, and 10,538,315 tons of bituminous, valued at $20,498,399.00.

In 1902 the consumption of coal was 1,895 pounds per capita, in 1911 the consumption had risen to 3,588 pounds per capita, showing that Central Canada, at least, is more dependent year by year, for fuel, upon a foreign source of supply. Last year nearly $40,000,000.00 was sent out of Canada for fuel alone.

Canadian coal deposits are either in the far West, or, far East, and the long freight haul makes the cost, particularly in Ontario and Quebec, of supplies from either point, prohibitive.

Other fuels must be sought. Wood for fuel is now so scarce that it cannot supply the country's requirements. Peat fuel is the only article in sight to supply them, and with large deposits available the fuel question will find a solution in Canada's deposits .

Crude peat is not a marketable product, *but machined peat is.* It is cleaner, better, and cheaper fuel at from $5.00 to $5.50 per ton than anthracite coal at from $7.00 to $7.50.

While anthracite coal carries 12,000 to 14,000 heat units per pound, and peat fuel but 8,000 to 10,000, the available heat units in peat are much greater proportionately than in coal, because the waste in peat is about 4 to 5 per cent., while that in coal runs from 16 to 26 per cent. waste.

POSSIBLE SOURCES OF HEAT AND POWER IN THE FUTURE

The Mining and Engineer World, speculating on possible sources of heat and power in the future says:—

> "The yearly production of vegetable matter on the earth is estimated at 32,000,000,000 tons, which if burned would yield a quantity of heat equal to that obtainable from 18,000,000,000 tons of coal—that is to say, 18 times as much heat as is furnished by all the coal now mined in Europe and America.
>
> "Is it not to be supposed that this production of plant substances may be so increased and intensified in selected regions as to supply all the fuel we can possibly want in the future We are now using for fuel purposes fossil solar energy in the form of coal. Why not utilize instead live solar energy?
>
> "Plants should be made to store up solar energy for conversion into mechanical energy. The kind of plants used is of no consequence. They may be grasses or trees; they may grow in swamps or dry places, on the sea coast or even in the sea. The essential point is that they shall grow fast or that their growth shall be accelerated.
>
> The production of plant substances over all the land surfaces of the earth averages 1 ton to the acre. By intensified culture it could be made 4 tons. This on 1 sq. mile would amount to 2560 tons, corresponding to about 1400 tons of coal.
>
> "In an epoch soon to arrive, the harvest of fuel plants dried by the sun will be converted entirely into gas for fuel purposes, separating out the ammonia, to be returned to the soil as nitrogenous fertilizer, together with all the mineral substances contained in the ashes. The gas thus obtained will be burned on the spot in gas engines, and the mechanical energy generated by this means will be transmitted over great distances, or utilized in any way that seems advisable. Even the carbonic acid resulting from combustion will be returned to the fields so that the latter may lose nothing of their productiveness."
>
> "Coal offers to mankind solar energy in its most concentrated form. Indeed modern civilization may be said to be the daughter of coal. But the supply of coal is not inexhaustible and every ton of it taken out of the earth leaves just that much less for the future needs of the world. Hence it is that today we are looking about us anxiously for some other source of fuel."

An important source of additional fuel for the more immediate future in Canada exists in our extensive peat bogs. These, and the great lignite areas of the Northwest, occupy a middle ground between coal on the one hand, and such vegetable fuels as wood, etc., on the other. With the reductions in our forest area due to settlement and other causes, and the consequent rise in fuel prices, the development of these latent resources has become a matter of general and immediate concern.

In order to carry out the principle of true conservation, what is called for is that this development shall proceed along such lines and by such methods as will secure the maximum of economic return. The indications are that this will be in many instances by production of power for distribution from a central station and utilization of by-products, as outlined by the Mining and Engineering World in the case of use of fuel plants. Successful installations have already been made in Europe employing such methods.

PEAT FOR PAPERMAKING.

A report on the Investigation of Peat Bogs and the Peat Industry of Canada is off the press by A. Anrep, the peat expert of the Dominion Government. Dealing with peat as a papermaking material, the report quotes from a report of Emil Hazulund as follows:

The question of manufacturing paper out of peat, especially out of unhumified sphagnum moss, has been raised many times. The inquiry has usually ended, however, with some small experiments. Scientific men in the paper industry do not seem to have had very much confidence in the results of these experiments; and this lack of confidence as will be shown was well founded.

The consistency of peat is such that, it cannot be expected to make strong and durable paper without the employment in its manufacture of complicated and extensive machinery necessary for the cleaning, bleaching and drying of the peat. This makes the finished product so expensive that it can hardly compete with the prices of the material now on the market.

At the Mosskulturforeining (Swedish Peat Society) museum is to be found a considerable collection of peat paper samples from different places. Some time ago several samples made from Irish peat were added. Comparison of these samples with those previously collected, caused an investigation to be made; to ascertain if they were made of peat.

Some of the tests of the strength of paper hereafter mentioned have been made according to the American standard by Engineer A. Skeppstedt at the Munksjo paper works—to whom I am indebted, and have to thank, for valuable written information. Several historical abstracts concerning foreign manufacturing have been taken from "Osterr-Moorzeitschrift." Herr Schreiber for many years gave short accounts of the different paper manufacturing firms and processes. Careful note was made of the length of time each firm lasted before going into bankruptcy, and of the losses entailed in each case.

(I) Pasteboard, manufactured at the Munksjo paper works in 1890, for experimental purposes, proved to be very loose, slightly glazed, thin, and golden brown in color, with dark stripes. Thinner paper was also produced. It had a tensile strength of about 15 English pounds, weighed 190 grams per square meter, and was 0.32 mm. thick.

Microscopic investigations. The main part of the material consists of unhumified perfectly hyaline (glass-like) sphagnum moss. The leaves are unfractured, and show, occasionally, distinct pores; but with a dissolved glass-clear substance. The stems are often quite long, and extend right across the field of view at 80 times enlargement. The woody texture in these is whole, but the bark may be lacking. However, there is to be found perfect bark structures with distinct retort shaped absorption cells.

Eriophorum vaginatum appears in dark strips up to 1 centimetre long, 0.1-0.8 mm. wide. This, at the enlargement seems to consist of bast elements from leaf sheaths. It is also found with brown striped bast threads, and between these hyaline (glass-like) epidermis cells; fine roots of carex occasionally occur. Fibres of spruce, sphagnum spores, and spruce pollen, are found in small quantities.

It can readily be seen that pasteboard of the above quality cannot possess much strength. The leaves and stems of the sphagnum mosses contain very little of the thread or bast elements which are required for manufacturing paper. The filtering capacity of the leaves is extremely small, and decreases as they disintegrate. Even the stems which contain wood substance have a small quantity of fibre. The wood substance is composed of only a few cells and thick layers of weak and short wood cells with little substance. Inwardly the stem assumes the texture of pith and outwardly of bark (airbags).

The binding elements in this case are the added wooden substances and eriophorum, while the sphagnum can only be considered as a filler, and as such, it is for most purposes unsuitable.

(II) Pasteboard from Lindefor's paper factory is almost straw-color and consists of different thicknesses—from 0.39 mm. to over 2.0 mm. The weight of the first-mentioned thickness is 300 grams per square meter and contains, according to the statements issued by the factory, 40 per cent. sphagnum moss and 60 per cent. woody substance.

The sphagnum moss consists mostly of absolutely unhumified hyaline leaves of different varieties, with a small amount of stems. These retain the bark-texture while the leaves are generally whole. Eriophorum vaginatum is less frequent.

As in the previous case, the sphagnum moss is little disintegrated, but on account of the large quantity of added wood fibres, it possesses greater strength. It is impossible to see the peat in the pasteboard with the naked eye; this can be distinguished only after microscopic investigation. It is noteworthy that the paper is of a light yellow color; foreign peat paper is always of a dark color.

It may be seen from the above data that the results of these tests were successful. However, owing to the great capacity which peat has for absorbing water, and the great expense entailed in removing the same, the experiments were not continued. This pasteboard was manufactured, according to Dr. Beddie's patent in Berlin.

The process is as follows: the raw peat is cleaned, first by mixing it in the machine with a weak solution of alcohol for removing the humus substance; it is then disintegrated in specially constructed machines and finally in most cases bleached. The bleaching process, it is claimed, is very difficult and costly

—much more so than in the case of wood fibre. Hence it has been shown that Sphagnum moss, even with the addition of a large amount of wood fibre, can not be used economically in the manufacture of paper.

Pasteboard manufactured by Engineer Ludwig Franz in Admont, Steiermark, is of a dark, grey-brown color, and is of several thicknesses. The thinnest quality had a tensile strength of 40 English pounds, weighed 400 grams per square metre, and was 0.54 mm. thick. Pasteboard 2.05 mm. thick had a tensile strength of 130 English pounds.

A. Cardboard: The surface is covered with minute fibres, which are not visible to the naked eye. The quantity of peat added is. in comparison, the same as in the Lindefors pasteboard. However, the Austrian sphagnum moss is more uneven than the Swedish; it is more humified and contains other kinds of peat residue, Eriophorum Vaginatum heather, and different kinds of carex. It seems that manufacturing was continued longer, which may be seen partly from the appearance of the cardboard and from the microscopic structure. Sphagnum leaves, humified to a certain degree, occur in smaller parts; unhumified pieces are often whole and hyaline (glass-like); the stems are very short and in many instances I have found the bark structure unfractured, the spirals of the absorption cells may also be very clearly noticed and even the spores of the sphagnum moss are well prsceved.

Eriophorum occurs in considerable amount and occasionally may be found as single fibres, but more often several fibres are gathered together in a flat, comparatively wide streak. Between the fibres occur parts of hyaline, epidermic, wave-shaped cell walls. The impurities found, consist of leaves of golden maidenhair, "Polytrichum commune," Jungermannia and some bark cells of heather, "Colluna vulgaris"; carex is found in the form of single, fine root branches. The fibres are composed chiefly of spruce and fragments of bark of the same plants are to be found. The fibres are bedded in pulp consisting of pith particles.

The sphagnum moss may also in this case be considered only as a filler, while the remaining peat substances, as for instance, eriophorum, heather, and carex, contain more or less of fibrous material, which contributes to the strength of the paper. Lumps without structure may be noticed, which, no doubt, originate from peat. These have no value, only making the paper dark and rendering the bleaching more difficult.

B. Pasteboard from the same place seems to be of the same composition as the above, the difference being so little that it is not worth while referring to it.

In 1902 a banker—Mr. Jellinks—and a few others started to manufacture paper at the factory in Admont, situated high up in the Steiermarks Alps. At the beginning the work was performed in an honorable manner, but later on

it was in operation only when the shareholders were expected to visit the plant. In 1904 it ended disastrously and the bank lost over a million kronor (1 kronor equals 27 cents).

In 1907 Engineer Ludo Franz started the operations anew, but shortly after he also was obliged to give up.

The situation of the factory was unfortunately chosen. The bog contained too little eriophorum peat. It was calculated that the wasted peat could be used as fuel, but on account of the heavy rainfall the drying was not successful. Lignite also proved to be an expensive fuel, but it was cheaper than using peat, even the peat litter factory employed lignite as fuel.

Thin paper, manufactured in October, 1897, by the firm, Karl A. Zschorner & Company, Vienna, contained, according to printed statements, 75 per cent. of peat. It had a tensile strength of 10 English pounds, had a weight of 105 grams per metre, and was 0.13 mm. thick.

The quantity of sphagnum moss is considerable, leaves mainly occur, which are usually disintegrated and dark in color. It may be noticed that the peat has not been fully humified; the particles of stems are rare, and when found the layer of bark structure is lacking.

Eriophorum occurs in a considerable amount. It is found partly as hyaline, epidermic, wavy-shaped cell walls, partly flat and sometimes in strips. The fibres are of a brownish color, and when enlarged 80 times it may be noticed that they are of a spiral shape and striped in a longitudinal direction with plainly visible cell walls at the ends.

The additional wooden substance is stated to be 25 per cent.. but it seems to vary in different samples, sometimes being more. An inconsiderable quantity of pine and spruce pollen, heather-bark, leaves of mosses, and single, fine roots of carex is to be found.

Some of the paper is colored in different shades; reddish ,blue-grey, brown and yellow-brown; the two first mentioned colors have been exposed to daylight (not the sun) which made them fade on the outside.

Concerning the strength, it is, as mentioned above, only 10 English pounds, while the Munksjo pasteboard of the same weight has a strength of 60-65 English pounds. It is doubtful for what purpose this paper could be employed, as it is unsuitable for wrapping paper.

Zschorner started his manufacturing in 1895. He and two other manufacturers exhibited samples of peat paper at the World's Exhibition in Paris. Shortly after the firm became bankrupt and the two other manufacturers also failed during the same year.

Finally, I have also investigated a paper of English manufacture. The samples received here consisted of a series of postcards, partly colored and

partly auto-typed. The paper is loose and of the same grey-brown color as the Admont paper. For this reason, the heading stating that the paper was manufactured from the old Irish soil from peat out of the Allan bog, could easily be believed. However, despite several investigations made by me, I was unable to find any peat substance in the paper. Usually all the samples from the other manufacturers contained considerable quantities of sphagnum moss, at least some vegetable substance was shown. Wooden and cotton fibres were principally found, consequently there is no peat, either as filler or fibre. If some of the dark, structureless lumps originate from intermixed peat, it could only add to the coloring of the paper; for the rest, the heading "Peat paper" is a fraud.

A short time ago Dr. Hallessy, of the Irish Geological Survey, stated in a letter to the Director, H. V. Feilitzen, that the manufacture of peat paper was discontinued four years ago. This will explain why the addition of peat in the paper is doubtful.

LIGNITE IN SASKATCHEWAN.

The extraordinary growth of the province calls for cheaper power and cheaper fuel, and this matter has been under consideration both publicly and privately for a very long time. The government decided last session to make an appropriation of $3,000 in order to obtain a report on the subject of producing power at the mines and distributing it throughout the province. The matter was given to Mr. A. J. McPherson, chairman of the Board of Highway Commissioners, who secured Mr. R. O. Wynne-Roberts to undertake the work. That gentleman immediately started to collect data as to what fuel was available and in what manner it was being consumed. He entered into correspondence with authorities in all parts of the world, so as to obtain the best information on the subject, and the report has now been handed in.

It will be apparent to the reader that the real development of Saskatchewan will in a large measure be dependent on the supply of cheaper fuel and power than is now available. At present about half a million tons of imported coal is being brought into the province from Western Canada and the States, and about 200,000 tons are being mined in the neighborhood of Estevan. About half of this goes to Manitoba towns; consequently the consumption of coal in the province amounts to about 600,000 tons, of which only 17 per cent. is of local production. Imported American coal costs anything from $8 to $13 per ton, and when it is borne in mind that the prosperity of the Eastern States of America is due to the low cost of fuel (for instance, it only costs $1 per ton in Pittsburgh), it is clear that industries are not possible without causing the production to be too high in price to compete with the imported article.

What is lignite? To understand what lignite is we must start with peat, which is the result of the decomposition of vegetable tissue in water when free from contact with air. Vegetation which is now found in swamps each year dies and fresh growth develops. In course of time the accumulation of vegetable matter assumes considerable thickness. Peat ranges in character from brown fibrous and friable matter to almost black carbonaceous matter. The next step in coal formation forms lignite which under pressure of superincumbent earth deposited through subsequent geological ages has been compressed, preserving in many cases its vegetable structure. In other cases, however, it is devoid of all signs of vegetation, when it is difficult to define the difference between it and bituminous coal. These two fuels belong to what geologists call the recent fossil age. The next kind of coal to be formed is bituminous, and finally we get the oldest coal, which is anthracite.

The next question is the value of the fuels for general use. Peat is used in many countries as domestic fuel and for the development of power, but as it usually contains from 80 to 90 per cent. of water it has to be air dried before it can be used with any degree of efficiency. Lignite also is used in some countries to a very great extent; for instance Germany consumes eighty million tons per annum, and some of the German and Austrian cities use more lignite than any other kind of fuel. Up to the present the quantity of lignite used in North America is comparatively small, which is due to the fact that there is abundance of cheap bituminous coal, but of late years more attention has been drected towards the use of lignite.

According to the Canadian Geological Survey reports there is a large field of lignite extending southwards from Moose Jaw to Estevan in one direction and westwards to Wood Mountain in the other. This area is of a triangular shape and is reputed to contain 15,000 million tons. This figure, however, is undoubtedly conservative, as wells have been sunk near Estevan in which several layers of lignite have been found to a depth of 600 feet. There is another lignite field in Saskatchewan, which lies along the Alberta boundary commencing with a line drawn from Maple Creek towards Saskatoon and back to the Alberta boundary north of Macklin. This also contains a very large amount of lignite, but has unfortunately not been prospected to the same extent as the southern field.

Lignite is being used to generate power at the flour mills in Saskatchewan and Manitoba, on occasions at the electrical plants in Regina and Moose Jaw, and in connection with gas producers at Rouleau and Swift Current. Owing to the absence of reliable information as to the resnlts obtained in consuming lignite for power generation Mr. Wynne-Roberts, with the authority of Mr. McPherson and the consent of Mr. Carpenter, deputy minister of public works, asked Mr. R. N. Blackburn, Wh. Sch., chief inspector of steam boilers, to undertake scientific and practical tests. These tests were made at Estevan and

Weyburn. Full particulars are given in the report, but it may here be pointed out that the net heating power obtained in steam power was only about 50 per cent. of that contained in the coal. In ordinary practice 70 per cent. is recognized to be good, and Mr. Wynne-Roberts in his reports points out that if 70 per cent. of heat value is worth, say, $100, fifty per cent. efficiency is only worth $70, so that there is a loss of $30 in every hundred. Information has been received showing that 70 per cent. efficiency has been secured with lignite in some German plants. It is therefore evident that it is worth an effort and some expenditure to secure better efficiency.

The Canadian government carried out some tests at McGill University in 1908, both with steam power and gas producers. The United States Bureau of Mines also carried out a large number of tests at St. Louis and at Pittsburg. There are a large number of plants in actual operation in Texas, which by the way is the largest consumer of lignite in North America. The average results of all these tests demonstrate that it is quite possible to develop one brake horse power by means of gas producers and engines for the consumption of about three pounds of lignite, but to obtain the same power by steam it is necessary to consume about three times as much. It is therefore apparent that lignite is better adapted for use in gas producers than in steam boilers.

Another use made of lignite is in the manufacture of gas in large quantity. Many experiments have shown the possibility of making gas from lignite suitable for general use. This is done by means of the ordinary gas works plant, but the coke residue from the coal cannot without treatment be utilised. It can, however, be made into briquettes and excellent fuel is by this means to be obtained. Experiments have also been made in this direction in Texas; Ann Arbor, Mich.; at St. Louis, Mo.; at Speccia, Italy, and at Teplitz, Austria, which are confirmed by the results obtained in North Dakota.

There is no doubt that by adopting suitable appliances for consuming lignite it can be used for the development of power. Lignite being so different from coal in that it contains so much volatile matter and water and much less carbon it must evidently be used in a different manner. The Germans have evolved special furnaces for this fuel to raise steam, and they have adapted a number of gas producers for gasifying the lignite. This aspect of the use of lignite is set forth in the report in a chapter of great length. Mr. Wynne-Roberts has submitted several schemes for the generation of power at large central power stations located at the lignite mines, with copious figures showing the estimated cost of installing and working the same. These estimates are based on the first instalment of 10,000 h.p. It is, of course, impossible to review these figures here, but the general results indicate that it is quite possible to develop and transmit power to a large number of our towns at a rate much below what now obtains. (The Public Service Monthly, Regina, Dec., 1912).

FUEL OIL AND ITS EFFECT ON TRANSPORTATION COSTS.

Fuel oil is effecting changes in both land and sea transportation that are little short of revolutionary. Coal locomotives have given place to oil locomotives on the Rocky Mountain division of the Canadian Pacific, and Southern Pacific is using them extensively, as is also Atchison. In short most of the big railroads tapping oil territory have found oil more economical for fuel than coal.

The economy in use of oil is more than mere economy of fuel cost. It is estimated that a modern steamship of the size of the large Cunarder, for instance, would be able to dispense with more than 200 firemen if fuel oil engines were substituted for turbines, and that the 5000 tons of coal required for a five-day trip across the Atlantic could be replaced with fuel oil that could be stored in the double bottom of such a vessel, thereby affording additional freight room. So far as cost is concerned, it is estimated that coal would have to be supplied at 40 cents per ton to equal current cost of fuel oil.

The Hamburg-American liner Christian X, a ship of 10,000 tons displacement burning fuel oil, on recent trip from Hamburg to New York, maintained an average speed of 11 knots per hour and is expected to attain 13 knots. She can stow 1000 tons of oil in her double bottom, but required on an average only 10 tons per day. It is claimed that this vessel can carry 1000 tons of freight more than one of similar size equipped with ordinary engines and can be operated at a saving of $50,000 a year.

PEAT DEVELOPMENT IN RUSSIA.

"The high price of oil, which has reached one cent per pound in Moscow, has obliged consumers to use every effort to find a substitute or limit consumption. For instance, the Sormove works which had increased their consumption of liquid fuel from 2,000,000 poods to 3,176,000 poods (36,112 to 57,346 short tons) per year, have again limited the consumption to 2,000,000 poods, and at the same time are developing the production of peat, buying wood, etc. They are said to have purchased about 260,000 acres of government land, on which they will produce peat and construct gas works and an electric station.

The Moscow Electric Co., which consumed 2,500,000 poods (45,140 short tons) of oil in 1911, has purchased an extensive area of peat with improved machinery.

The supply of peat in the Central Provinces is immense, and there is no cause for apprehension that it will prove insufficient."—U.S. Consular Report.

AMMONIUM SULPHATE IN CHINA.

Sulphate of ammonia is used in the Amoy district of China principally for fertilizing rice and sugar-cane fields. It is said to have four times the strength of the Manchurian bean cake, extensively used, and to cost but three times as much which, taken together with the added facility of application, creates a growing market.

In 1903 a trial shipment of 40 catties (53 lbs.) was received at Amoy.

The imports for 1911 were 7,000 long tons and up to October 31, the imports for 1912 amounted to about 9,000 long tons.—U.S. Consular Report.

Journal of the Canadian Peat Society

Published Quarterly by

THE CANADIAN PEAT SOCIETY

22 Castle Building, Ottawa, Can.

Subscription Price (4 numbers)........ **$1.00**

Advertising rates will be furnished on application.

Remittances may be made by cheque (payable at par in Ottawa), draft, money order, or postal note to the Secretary-Treasurer of The Canadian Peat Society, 22 Castle Building, Ottawa, Can.

EDITORIAL.

On page 23 et seq. will be found a continuation of the tabulated statement of retail prices of fuel in Canada for a period of three years. This table shows in a clear manner the general rise of prices throughout the country. In many districts in the older settled portions the supply of wood has almost disappeared.

On page 26 appears a reprint of the table of Analyses of Peat Samples published in the February issue of the Journal. In the report from which the table was taken an error occurred in transposition of the figures for nitrogen and phosphorus in the last five samples. The table is reprinted for the purpose of correcting this error.

A Joint Convention of the American and Canadian Peat Societies will be held in Montreal on August 18, 19 and 20. A number of important papers will be presented, and the meeting is expected to be of unusual interest. The programme will include visits to the peat fuel plants now in operation at Alfred, Ont., and Farnham, Que. These are the largest peat fuel plants actually working on the continent, and owing to the improved methods of production which have been inaugurated a visit to these plants will prove of very great interest to all who are in any way concerned in the development of the peat industry at Alfred. There is installed a new Anrep mechanical excavator, a cable-way for handling the raw peat and depositing it on the drying ground, a new spreading device and other improvements of great interest. Members and friends of both Societies and all others interested in peat are cordially invited to be present. For programme and further information address the Secretary of this Society or Julius Bordollo, Secretary American Peat Society, Kingsbridge, New York City.

In the February Journal reference was made to the investigation of peat power plants in Europe under direction of the Mines Branch by Mr. B. F. Haanel, Chief of the Fuel Testing Division, assisted by Mr. John Blizard. A comprehensive report of the results of this investigation is now in course of preparation and will be issued shortly as a Bulletin of the Department of Mines. The information is not yet available for publication in the Journal, but it is understood that the forthcoming report will contain much valuable data on the subject of utilization of peat deposits for the development of cheap power.

PROGRESS OF THE PRODUCER-GAS ENGINE.

At the Ford works in Detroit there is being installed the most powerful producer-gas engine yet built in any country. The engine was built at Hamilton, Ohio, by the Hooven, Owens, Renschler Co. There are four double-acting cylinders, 42x72 ins., two in tandem on each side. The engine is designed to run at 85 r.p.m. or 1020 ft. of piston speed. Its length is 73 feet and its over-all width 32 feet. The generator is capable of carrying a 25 per cent. overload, and the engine has acapacity of 5000 i.h.p.

The United States Steel Corporation are putting in a number of large gas engines at Gary, Ind., as are also the Maryland Steel Co. at Sparrows Point, Md.—"Power."

Mr. Anrep, of the Mines Branch at Ottawa, is here to survey the peat bogs of P. E. Island and report as to their utility as sources of heat. His visit will be welcomed, and the results will be interesting to many persons in view of the continuously increasing cost of coal and the continually decreasing area of our wood lands.—Charlottetown Examiner.

PATENTS RELATING TO PEAT ISSUED BY THE CANADIAN PATENT OFFICE.

Patent No. 170663 (Dec. 7th, 1912).

T. Rigby, Dumfries, Scotland.

(Assigned to The Peat Coal Investment Co., Limited).

Getting or Excavating Peat.

The invention relates to the gathering of peat, and has for its object to ensure continuity of supply of peat from the bog to the locality at which it is being employed, *e.g.* peat carbonizing apparatus situated near the bog, independently of cold winter temperatures, which result in freezing the bog or deposit.

An excavation of the bog or deposit, of limited size, but of capacity to contain a supply of peat sufficient for the cold period is kept distinct from the main excavation of the bog, and is used to contain a sufficient quantity of the peat for the normal working of the period, the excavation being of such depth that freezing cannot under ordinary cold conditions occur to excessive extent.

The peat collected from the main area of the bog is finely macerated, and then conveyed by pipe line to the storage area. In the latter is placed a dump pit, from the bottom of which the macerated peat may be pumped during the cold period, and conveyed by pipe line, situated in a covered trench, to the factory.

Owing to the fact that peat is an extremely bad conductor of heat, freezing of the store area occurs only superficially, and by carrying the pipe line below the frozen surface, pumping of the mass to the factory may be carried on continuously. It is stated that peat which has been excavated and disintegrated to such an extent that its fibrous structure is destroyed, so that it is possible to pump it, forms a fluid slimy mass from which the solid matters do not settle.

Claims:—

1. A method for ensuring continuity of working in a peat installation by excavating the peat from the bog and conveying it hydraulically, in which the peat is, immediately after its excavation, disintegrated, and is supplied to a store area of sufficient depth to prevent any but superficial freezing, and of sufficient size to permit of uninterrupted working during the cold season, and is conveyed therefrom to the desired locality as required through a pipe line having its intake below the level at which any freezing may occur, as set forth.

2. In a peat deposit in combination a store excavation, a working excavation, means for excavating peat in said working excavation, means supplied therefrom for disintegrating and finely macerating the peat and means supplied by said latter means for conveying hydraulically the disintegrated peat to the store ex-

cavation, together with means adapted to take peat from below the surface of the store of peat and for conveying the same to the desired locality, as set forth.

3. In a peat gathering installation on a peat deposit an excavation, means separating off a part of said excavation, said separated portion being of a sufficient depth to prevent more than partial freezing of material contained therein under cold season conditions, means in said separated portion for withdrawing peat contained therein from the lower part thereof as desired, and means on the other part of said excavation adapted to gather peat and supply it to said separated area as set forth.

4. In a peat gathering installation on a peat deposit a main excavation, a further excavation separated therefrom and of a sufficient depth to prevent more than partial freezing thereof under cold season conditions, means in said main excavation for gathering peat, means for macerating peat directly supplied by said gathering means, pumping means supplied thereby, and a pipe line connecting said pumping means to said further excavation, together with means for drawing off macerated peat from the lower part of said excavation and supplying it to the desired locality, as set forth.

No. 146958. (April 1, 1913).

Nils Testrups and Olof Soderland of London, Eng.
Removal of water from wet-carbonized peat.

The removal of water from wet-carbonized peat presents certain difficulties.

By ordinary filtration the water content is reducible only to about 90%.

By employing a pressure of 100 lbs. to the square inch for forcing the peat into the filtering chamber, the water has been reduced only to 66%.

To further reduce the water content greatly increased pressure is required and serious difficulties arise in ensuring even distribution of the pressure and in providing apparatus, strong and large enough to deal with the great quantities of material to be handled in practice.

Various attempts to accomplish this by special apparatus have been unsuccessful. A press of the type having laminated walls, and a screw feeding member, and having a restricted orifice failed, owing to the spaces between the laminae becoming choked, and the plug formed at the restricted orifice being forced out, allowing free passage of the material under treatment.

An apparatus comprising a reciprocating plunger pump with an open ended cylinder intended to be closed by a plug of the material and filtering means around the cylinder, the peat being forced into the cylinder has also been a failure.

The relatively high speed of the plunger resulted in the first place in no filtration, owing to the elasticity of the material, and the plug was blown out, giving free passage to the material.

The objeet of this invention is to overeome these diffieulties. It has been observed that when the pereentage of water in the press eake in the filter press falls to about 70%, the material loses its plastieity or fluidity. The pressure is then highest near the inlet of the peat to the apparatus (the point of applieation of the pressure) and diminishes as the distanee from the inlet inereases. Inerease of pressure beyond about 100 lbs. to the square ineh, is praetieally useless, as it results in a rupturing of the press eake and the formation of ehannels through whieh filtration proeeeds without further drying aetion on the eake already formed.

In the new proeess the peat passes from the reeeiver attached to the earbonizer into a filter press in whieh a pressure of from 100 lbs. to 150 lbs. to the square ineh is employed. As the press eake must be removed from the filter press after about 25 minutes operation, two or more presses are used with means to eut off the supply to one in order that it may be emptied while another is in use.

The material is then eonveyed to a press of the band press type so construeted as to be eapable of giving a gradually applied and high pressure. The strong perforated endless bands are plaeed eloser together as they approach the far end of the press so that the material receives a eonstantly increasing pressure, the liquid passing away through the perforations of the links of the bands. The final pressure may amount to about 600 lbs. to the square ineh, and the band press must be so construeted as to give a very high pressure without undue friction.

In the first stage of the proeess filtration is brought about through keeping up pressure by pumping more fluid into a ehamber of eonstant volume, (in the filter press); in the seeond stage the size of the eonfining ehamber is redueed as the water is extracted (in the band press).

The material as it leaves the band press is said to eontain about 50% water and to be suitable for direet use in a gas producer, preferably an ammonia recovery produeer, for whieh it is elaimed to be partieularly suitable or it may be broken down and dried by artifieial heating down to about 5 to 15% moisture and then heated for briquetting.

The following detailed example of the working of the method is given:—

"In a faetory in which 86 tons of peat, eontaining about 90% water (equal 8.6 tons of dry peat) was earbonized per hour, whieh peat was ehanged to sueh an extent in the oven that only 6.9 tons of dry peat substanee remained admixed with the liquid, in order to reduee the water eontent of the material to the neighborhood of 70% moisture, seven filtering presses containing 10,000 sq. ft. of filtering surfaee were required. By using these filtering presses intermittently and in regular rotation, it was possible to reduee the water as low as 67% by weight when using a pressure eorresponding to 120 lbs. per sq. in.

maximum. 25 minutes approximately were taken to reduce the water content from 92% to 67%, the pressure in the interior of the filter presses being gradually increased from little or nothing to 120 lbs., which maximum was kept on for 15 minutes and was necessary to reduce the liquid content to about 70%. It became practically impossible to reduce the water content below about 70% by means of the filter presses. External pressure was then applied in a band press having 60 sq. ft. of pressing surface, and having a final pressure of about 600 lbs. per sq. in., the time occupied in the band press being about 42 seconds.

Claims.

1. A process for the treatment of peat, including subjecting the same to wet carbonization in which high pressure is generated in the material, utilizing the said pressure to remove the bulk of the liquid matter, and separating a further quantity of liquid by sustained external pressure ,as set forth.

2-4. Further process claims.

5-8. Claims on apparatus..

HEAT VALUE BY CALCULATION.

The combustion of a given element always results in the generation of a fixed amount of heat. Thus, when a pound of pure carbon burns completely (forming CO_2) 14,600 B. t.u. is produced. When 2 lb. is burned, 29,200 B. t. u. is generated, and so on. Consequently, the heat value of carbon is said to be 14,600 B. t. u.—which means 14,600 B. t. u. per lb., as the pound is the unit of weight almost universally used in this country.

When a pound of pure carbon burns incompletely (forming CO), only 4450 B. t. u. is produced. But if, in turn, the resulting 2 1-3 lb. of CO, which is a combustible gas, is burned, 10,150 additional B. t. u. is liberated, making the total heat produced equal to 14,600 B. t. u., just the same as though the pound of carbon had burned completely (to CO_2) in the first place. Hence, the heat value of CO is

$$\frac{10.150}{2.333} = 4350 \text{ B t.u. per lb.}$$

The heat value of pure hydrogen is 62,000 B. t. u. per lb.

These heat values for carbon and hydrogen were established by experiment and hence probably are not absolutely exact. In fact, some authorities give values for carbon as low as 14,220 and as high as 14,647, and for hydrogen as low as 61,816 and as high as 62,032, but as the ones given (14,600 and 62,000) are the most widely accepted and used, it is best to accept them for use in our work

The heat value of sulphur, the only other heat-producing element in the common fuels, is 4050 B. t. u. per lb. While this fact is interesting, it is not important in practical work, because, in addition to the heat value of the sulphur itself being low, the percentage of sulphur in the average fuel is also low; besides, the sulphur may not be pure and hence may have no heat value whatever. Thus the amount of heat due to the sulphur is very small compared with that given by the two main elements, carbon and hydrogen.

To estimate the heat value of a pound of fuel containing both carbon and hydrogen, simply multiply the percentage of total carbon in the fuel (expressed as a decimal) by 14,600, the percentage of available hydrogen (also expressed as a decimal) by 62,000 and add the results together.

To illustrate, assume we wish to estimate the heat value of a coal with thls analysis:

Carbon 68.12 per cent.; hydrogen 4.98 per cent.; oxygen 7.42 per cent.; nitrogen 1.98 per cent.; sulphur 4.54 per cent.; ash, 12.96 per cent.

The heat due to the carbon is

$$0.6812 \times 14{,}600 = 9{,}945.5 \text{ B.t.u.}$$

The available hydrogen equals

$$0.0498 - \frac{0.0742}{8} = 0.0405$$

and this, multiplied by the heat value of hydrogen,

$$0.0405 \times 62{,}000 = 2{,}511 \text{ B.t.u.}$$

the heat due to the hydrogen in the coal. The sum of these two quantities is

$$9{,}945.5 + 2{,}511 = 12{,}456.5 \text{ B.t.u.}$$

the heat value of the coal.

HEAT VALUE BY FORMULA.

The foregoing method can be expressed in a formula as follows:

$$C \times 14{,}600 + (H - \frac{O}{8})\ 62{,}000 = \text{B t.u. per lb.}$$

where

C = Decimal part by weight of carbon in the fuel;
H = Decimal part by weight of hydrogen in the fuel;
O = Decimal part by weight of oxygen in the fuel.

To apply this formula to another example, assume a coal with this analysis: Carbon 65.23 per cent.; hydrogen 4.95 per cent.; oxygen 1.485 per cent.; nitrogen 1.66 per cent.; sulphur 2.10 per cent.; ash 11.21 per cent. Substituting in the formula, we have

$$0.6523 \times 14{,}600 + (0.0495 - \frac{0.1485}{8})\ 62{,}000 = 11{,}439 \text{ B.t.u.}$$

The foregoing method or formula may be used for any other kind of fuel or for oil, wood, gas, etc. In dealing with gas, however, care must be used that volumes and weights are not confused to produce error. A common method of stating the heat value of a fuel gas is in B. t. u. per cubic foot or per 1000 cu. ft. In such cases the temperature and pressure of the gas must also be specified because these influence the volume greatly. The temperatures most frequently taken are 32 and 60 deg. F., and the pressure, 14.7 lb., absolute.—"Power."

HEAT VALUE OF PEAT FUEL.

In forming an estimate of the comparative heat value of peat fuel the customary method of basing same on the ultimate analysis of the fuel is misleading and does not fairly represent the fuel value of the peat. E.g. in Vol. 1, No. 2 of the Journal at page 13 appears the ultimate analysis of peat used at Portadown, Ireland, as follows:—

Carbon	44.60
Hydrogen	5.42
Nitrogen	0.97
Ash	1.10
Moisture	18.98
Oxygen (by diff)	28.93
	100.00

Theoretically one and a half tons of this peat would equal in value the above coal containing 11.439 B. t. u.

In practise the heat value of the peat is much higher comparatively than these figures would indicate, owing to the fact that more perfect combustion of the peat than of the coal will be obtained under working conditions.

As above pointed out, a lb. of carbon giving 14,600 B. t. u. when completely burned (giving CO_2) gives only 4450 B. t. u. when burned incompletely (forming CO).

Actual heating results obtained therefore depend to a very great extent on the completeness of combustion.

Not only is there a large waste of the heat value of many coals due to loss of gases containing unburned carbon, but with the lower grades of coal especially, considerable amounts of unconsumed carbon are carried off in the form of smoke. Peat burned under proper conditions is practically smokeless, and the loss of unconsumed carbon in gases formed is small, owing to more complete combustion.

QUANTITY OF AIR REQUIRED.

Peat burns with a much smaller air supply than coal, and this directly affects heat losses, through the necessity of employing a greater draft to burn coal. A recent article in "Power" states:—

"The total loss in the dry chimney gases (in burning coal for steam generation) in best practice averages 25 per cent. of the total heat generated from the fuel, calculated as follows:—

"Assume the air supply to be theoretically correct proportioned to the amount of coal burned, i.e. 11.5 lbs. per lb. of combustible; atmospheric temperature, 60 deg. F.; stack temperature at the base 450 deg. F.; specific heat of the flue gases, 0.24. Then the heat carried away by the least possible weight of chimney gases with perfect combustion and the conditions specified above would be

$$(11.5 + 1) \times (450 - 60) \times 0.24 = 1170 \text{ B.t.u.}$$

with fuel having a calorific value of 12,500 B. t. u. per lb., this means an unavoidable loss of

$$\frac{1170}{12,500} \times 100 = 9.36 \text{ per cent.}$$

The remaining 15.64 per cent. loss is due to the excess air necessary for complete combustion."

UNIFORMITY OF PRODUCT.

Another element of much practical importance is the greater uniformity of product. Machine peat made by modern approved methods, should be practically uniform in quality from a given bog. Peat from different bogs will of course vary in quality. Coal which shows a high B. t. u. from analysis of selected samples may be so mixed with slate and other impurities as to give poor results. So that while tests of clean coal may shew a fuel of high grade, the heating value of the entire cargo from which it is taken may be much lower.

LOSS OF FUEL THROUGH GRATES.

In the burning of coal under ordinary conditions, a high percentage of the fuel value is often lost in the form of fine coal, clinkers and ash shaken through the grates, in order to keep the fires open to air supply.

The loss on this account in burning of peat is vastly less. Requiring less draft it does not need frequent shaking. Combustion being practically perfect no clinkers are formed, the only residue being a very fine ash which drops through the openings in the grate-bars.

RETAIL PRICES OF FUEL IN CANADA.

(Continued from February Journal).

The following tables set forth the retail prices prevailing on, or about, the fifteenth of each month from May, 1910, to December, 1912, inclusive, of coal and wood in the leading centres of industry throughout Canada.

The list of localities includes nearly every place having a population of 10,000 people, and is representative of every Province in the Dominion.

The quotations were furnished to the Department of Labour by the correspondents of the Labour Gazette in the respective localities, under detailed instructions from the Department as to sources of information, quality of goods to be quoted, etc., and have been compiled from the table of Retail Prices of Staple Articles of Consumption, published monthly in the Labour Gazette.

The prices quoted are per ton of 2,000 lbs. of coal, and per cord of wood.

Abbreviations:—H.C.—Hard Coal (Anthracite).

S.C.—Soft Coal, (Bituminous, in some cases in the Western Provinces, Lignite).

H.W.—Hard Wood.

S.W.—Soft Wood.

	WINNIPEG, MAN.				BRANDON, MAN.				REGINA, SASK.				SASKATOON, SASK.			
	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
1910																
May	10.50	9.00	6.00	—	11.25	9.00	6.25	4.75	12.50	8.50	8.00	7.75	—	—	—	—
June	"	"	"	5.00	"	"	6.75	"	"	"	"	7.25	—	—	—	—
July	"	"	"	"	"	"	"	"	"	"	"	"	—	—	—	—
August	"	"	"	"	"	"	"	"	"	"	"	"	—	—	—	—
September	"	"	7.50	6.00	"	"	"	"	"	"	"	7.75	—	—	—	—
October	"	"	"	"	"	"	6.00	5.00	"	6.50	"	"	—	—	—	—
November	"	"	"	"	11.50	"	6.75	4.75	13.00	8.50	"	"	15.00	9.50	—	7.00
December	"	"	"	6.50	"	"	"	"	"	"	"	"	—	—	—	—
1911																
January	"	"	"	"	—	—	—	—	"	"	"	"	—	—	—	—
February	"	"	7.25	5.75	—	—	—	—	13.50	"	9.00	8.50	15.00	9.50	—	7.00
March	"	"	7.00	5.50	11.25	9.00	7.60	5.00	"	"	"	"	—	—	—	—
April	"	"	6.50	5.75	"	"	6.75	4.75	"	"	"	"	15.00	9.50	—	7.00
May	"	"	6.75	"	"	"	"	"	"	"	"	"	—	—	—	—
June	"	"	"	"	"	"	"	"	"	"	"	"	—	—	—	—
July	"	"	"	"	"	"	"	"	"	"	"	"	—	—	—	—
August	"	"	"	6.00-7.25	"	"	"	"	"	"	"	"	—	—	—	—
September	"	"	7.25	6.00	"	"	"	"	"	"	"	"	—	—	—	—
October	"	"	7.00	"	11.75	"	"	"	12.50	10.00	"	"	—	—	—	—
November	"	9.50	"	"	11.25	"	7.00	5.00	"	"	"	"	—	—	—	—
December	"	"	"	"	"	9.25	9.00	6.00	"	"	"	"	—	—	—	—
1912																
January	"	9.00	8.00	"	11.50	"	8.00	5.50	"	"	"	"	—	—	—	—
February	"	"	"	"	"	"	"	"	"	"	"	"	13.50	7.50-8.50	—	6 50
March	"	"	"	"	"	"	"	"	"	"	"	"	"	"	7.00	5.00-6.00
April	"	"	7.50	"	"	"	"	"	"	"	"	"	"	"	"	6.00
May	"	"	"	5.50	"	"	"	"	"	"	"	"	"	"	7.50	5.50-6.50
June	"	"	7.00	"	"	"	"	"	"	"	"	"	"	8.50	"	6.50
July	"	"	"	6.00	"	"	"	"	"	"	"	"	"	"	7.00	"
August	"	"	"	5.50	"	"	"	"	"	"	"	"	"	"	7.50	6.50-7.00
September	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	6.50
October	11.00	"	"	"	"	"	7.50	"	"	"	"	"	14.00	10.00	"	"
November	"	"	7.50	6.00	11.75	9.50	8.75	6.75	"	"	"	"	"	"	"	"
December	"	"	"	"	"	"	"	"	13.25	"	"	"	"	"	"	"

RETAIL PRICES OF FUEL IN CANADA—*Continued.*

	MOOSE JAW, SASK				CALGARY, ALTA.				EDMONTON, ALTA.				LETHBRIDGE, ALTA.			
	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
1910																
May	13.50	8.00	—	9.00	8.00	6.50	—	5.50	—	3.50	—	3.00	—	—	—	—
June	"	"	—	9.50	"	"	—	—	—	"	—	3.50	—	—	—	—
July	"	"	—	"	"	5.50-6.00	—	—	—	"	—	3.00	—	—	—	—
August	"	"	—	"	8.50	6.50-6.75	—	—	—	"	—	"	—	—	—	—
September	12.50	"	—	"	"	"	—	—	—	"	—	"	—	—	—	—
October	13.50	"	—	"	"	"	—	—	—	3.50-4.00	—	"	—	—	—	—
November	"	"	—	"	"	"	—	—	—	"	—	"	—	—	—	—
December	"	"	—	"	"	6.25-6.75	—	—	—	4.00	—	"	—	—	—	—
1911																
January	—	—	—	—	"	"	—	—	—	"	—	"	—	—	—	—
February	—	—	—	—	"	"	—	—	—	3.75	—	"	—	—	—	—
March	—	—	—	—	8.25	"	—	—	—	3.50	—	"	—	—	—	—
April	—	—	—	—	850	5.50	—	—	—	"	—	"	—	5.25	—	—
May	—	—	—	—	"	"	—	5.75-7.00	—	"	—	"	—	6.50	—	—
June	—	—	—	—	"	"	—	"	—	4.00	—	"	—	5.50	—	—
July	—	—	—	—	"	"	—	"	—	"	—	"	—	"	—	—
August	—	—	—	—	13.50	6.50	—	"	—	"	—	"	—	6.00	—	—
September	—	—	—	—	—	—	—	—	—	"	—	"	—	"	—	—
October	—	—	—	—	—	—	—	—	—	5.00	—	3.50	—	6.50	—	—
November	—	—	—	—	—	—	—	—	—	"	—	"	—	7.00	—	—
December	—	—	—	—	—	—	—	—	—	—	—	—	—	5.00	—	—
1912																
January	—	—	—	—	13.50	575-7.00	7.00	5.75	—	—	—	—	—	4.50	—	—
February	—	—	—	—	—	—	—	—	—	—	—	—	—	"	—	—
March	—	—	—	—	—	—	—	—	—	4.50	—	3.00	—	"	—	—
April	—	—	—	—	—	—	—	—	—	"	—	3.50	—	"	—	—
May	—	—	—	—	—	—	—	—	—	"	—	"	—	"	—	—
June	—	—	—	—	7.00-8.75	6.75	6.75	5.50-8.50	—	4.00	—	"	—	"	—	—
July	—	—	—	—	"	"	"	"	—	"	—	"	—	"	—	—
August	—	—	—	—	"	"	"	"	—	"	—	"	—	5.00	—	—
September	—	—	—	—	"	"	—	—	—	"	—	"	—	"	—	—
October	—	—	—	—	"	"	—	—	—	4.50	—	"	—	"	—	—
November	—	—	—	—	—	—	—	—	—	5.00	—	"	—	"	—	—
December	—	—	—	—	—	—	—	—	—	4.75	—	"	—	"	—	—

RETAIL PRICES OF FUEL IN CANADA—*Continued.*

	NELSON, B.C.				NEW WESTMINISTER, B.C.				VANCOUVER, B.C.				VICTORIA, B.C.			
	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.	H.C.	S.C.	H.W.	S.W.
1910																
May	9.50-10	7.00-8.25	—	6.00	—	7.75	—	5.00	12 50	7.50	—	5.00	—	6.50-7.50	—	4.50
June	"	"	—	"	—	"	—	"	—	"	—	3.00-3.50	—	—	—	6.50
July	"	"	—	"	—	"	—	"	—	"	—	3.00	—	—	—	6.00
August	"	"	—	"	—	"	—	"	—	"	—	4.00	—	—	—	—
September	"	"	—	"	—	"	—	"	—	"	—	5.00	"	"	—	"
October	"	"	—	"	—	"	—	"	—	"	—	4.50	11.50	6.50-7.50	—	—
November	"	"	—	"	—	"	—	"	"	"	—	"	"	"	—	6.00
December	"	"	—	"	—	"	—	"	—	"	—	5.00	"	"	—	"
1911																
January	"	"	—	"	—	"	—	"	—	"	6.00	3.50	"	"	—	7.00
February	"	"	—	"	—	"	—	"	—	"	—	5.50	"	"	—	6.00
March	"	"	—	"	—	"	—	"	—	"	—	"	"	"	—	"
April	"	"	—	"	—	"	—	"	—	"	—	"	"	"	—	"
May	"	"	—	"	—	"	—	"	—	"	—	"	"	"	—	"
June	"	"	—	"	—	"	—	"	—	"	—	"	"	"	—	"
July	"	"	—	"	—	"	—	"	—	"	—	"	"	"	—	"
August	"	8.00-12	—	"	—	"	—	"	—	"	—	"	"	"	—	"
September	"	"	—	"	—	"	—	"	—	"	—	"	"	"	—	"
October	"	"	—	"	—	8.00	—	6.50	—	"	—	"	"	"	—	"
November	8.50-12.50	9.50	—	"	—	10.50	—	"	—	8.00	—	6.00	"	"	—	"
December	9.50-17	7.50-12	—	"	—	8.00	—	"	—	"	—	5.50	"	"	—	"
1912													"	"	—	"
January	12.50	8.75	—	6.50	—	"	—	"	—	—	—	—	"	"	—	"
February	12.00	"	—	—	—	"	—	"	—	—	—	—	"	"	—	"
March	"	"	—	6.50	—	"	—	"	—	—	—	—	"	"	—	"
April	"	"	—	"	—	"	—	"	—	—	—	—	"	"	—	"
May	"	"	—	"	—	"	—	"	—	—	—	—	"	"	—	"
June	"	"	—	"	—	"	—	"	—	—	—	—	"	"	—	"
July	"	"	—	"	—	"	—	"	—	—	—	—	"	"	—	"
August	"	"	—	"	—	"	—	"	—	—	—	—	"	"	—	"
September	"	"	—	"	—	"	—	"	—	—	—	—	"	"	—	"
October	"	"	—	"	—	"	—	"	—	—	—	—	"	"	—	"
November	"	"	—	"	—	"	—	"	—	7.50-7.75	—	—	"	"	—	"
December	"	"	—	"	—	"	—	"	—	7.50-8.00	—	—	"	"	—	6.50

The Following Table Shows the Analyses from the Different Peat Samples Collected in Ontario.

No. of Samples from each Bog	Peat from	Composition of Peat.	ANALYSES OF PEAT (absolutely dry). Volatile matter	Fixed Carbon	Ash	Phosphorus	Sulphur	Nitrogen	Calorific value, B.T.U. per lb.
1	Mer-Bleu, Ontario	Sphagnum more or less mixed with eriophorum	65.90	24.22	10.88	--------	--------	--------	8821
2	" "		67.57	25.35	7.18	0.026	0.314	1.40	9021
3	" "		68.40	25.00	6.60	--------	--------	--------	
4	" "		63.22	24.86	11.92	--------	--------	--------	8805
5	" "		68.76	25.73	5.51	--------	--------	--------	9126
6	" "		68.73	26.27	5.00	0.024	0.317	1.13	9441
7	" "		69.49	26.04	4.47	--------	--------	--------	9301
1	Alfred, Ontario	Principally formed by sphagnum	68.13	26.56	5.31	0.029	0.292	1.23	8730
2	" "		68.72	24.22	7.06	0.022	0.375	1.92	9058
1	Welland, Ontario	Sphagnum mixed with carex, eriophorum, and hypnum	67.14	26.48	6.38	0.027	0.317	1.13	9118
2	" "		70.90	24.84	4.26	0.024	0.248	1.74	8596
3	" "		70.53	24.28	5.19	--------	--------	--------	8667
1	Newington, Ontario	Sphagnum slightly mixed with aquatic plants.	66.75	25.77	7.48	0.028	0.530	1.85	8721
2	" "		67.07	26.27	6.66	0.030	0.494	1.80	8465
3	" "		68.84	26.65	4.51	--------	--------	--------	8877
4	" "		71.32	24.44	4.24	0.032	0.345	1.63	8336
5	" "		69.54	26.75	3.71	--------	--------	--------	9102
6	" "		65.77	27.30	6.93	--------	--------	--------	8210
7	" "		66.97	26.70	6.33	--------	--------	--------	8312
1	Perth, Ontario	Sphagnum mixed with hypnum.	70.34	25.35	4.31	0.030	0.405	1.66	9067
2	" "		71.51	24.60	3.89	0.027	0.334	1.94	9148
1	Victoria Road, Ontario	Hypnum mixed with sphagnum.	69.52	25.18	5.30	--------	--------	--------	8649
1	Brunner, Ontario	Principally hypnum	64.09	25.16	10.75	0.035	0.303	1.73	8850
1	Komoka, Ontario	Sphagnum mixed with carex	60.90	18.52	20.58	0.087	1.34	1.63	7490
1	Brockville, Ontario	Carex slightly mixed with eriophorum and aquatic plants.	66.70	21.75	11.75	0.938	0.90	2.41	8173
1	Rondeau, Ontario	Carex mixed with remains of grasses and aquatic plants.	61.00	22.90	16.10	0.049	0.73	2.77	7914
1	Alfred, Ontario: part of bog	Sphagnum slightly mixed with hypnum and eriophorum.	68.23	26.00	5.77	0.033	0.218	1.76	9005

*From Bulletin 8, Department of Mines, Mines Branch.

Vol. 2 AUGUST, 1913 No. 3

JOURNAL

OF THE

CANADIAN PEAT SOCIETY

Published Quarterly by the Society
Subscription Price - $1 per annum
Single Number - Twenty-five cents

CANADIAN PEAT SOCIETY
Room 22, Castle Building Ottawa, Canada

TABLE OF CONTENTS

Journal of the Canadian Peat Society

Vol. 2 AUGUST, 1913 No. 3

JOINT MEETING OF CANADIAN AND AMERICAN PEAT SOCIETIES.

Held at Montreal, August 18, 19, and 20, 1913.

In order that members of both Societies might have an opportunity of seeing the peat fuel plants at Alfred, Ont., and Farnham, Que., in course of regular operation, an invitation was extended by the Canadian Peat Society to the Executive of the American Peat Society to hold their Seventh Annual Meeting in the City of Montreal. This invitation was duly accepted and the date of the meeting fixed for August 18th, so as to take place well before the close of the season for active work in making peat fuel. By courtesy of the Canadian Society of Civil Engineers the sessions were held in their splendid new rooms on Mansfield street, the fine audience hall and reading rooms being made free to the Peat Societies during the meeting. Although the attendance, owing to the date of the meetings was not large, much enthusiasm was displayed by the representative body of members present and a most interesting program was presented.

MORNING SESSION, AUGUST 18th.

The meeting opened at 10 a.m., with Mr. Carl Kleinstueck, of Kalamazoo, Mich., in the chair. After the opening formalities papers were read as follows:

Utilization of Peat in Agriculture as a substitute for Manure, by Mr. John N. Hoff of New York, President of the American Peat Society.

The Full Meaning of Moisture in Peat, by Mr. Robert Ransom, of Pablo, Florida .

A Contribution to the History of Peat, by Dr. Herbert Philipp, of Perth Amboy, N.J.

Peat in Agriculture, by Prof. W. R. Beattie of St. Louis, Mo.

Peat Moss: Some of its uses, its manufacture, and its future on this continent, by W. F. Todd, of St. Stephens, N.B.

Brief discussion limited to ten minutes followed each of these papers. The papers will appear in later numbers of the Journal of the Canadian Peat Soeiety.

AFTERNOON SESSION.

The Afternoon Session commenced at 2 p.m. Mr. P. L. Smyth of Montreal, the Vice-President of the Canadian Peat Society, in opening the meeting, said:

I am very glad that we are holding this joint meeting, not only because of the pleasure it gives us to welcome our friends from the United States among us, but also because I am sure the intercourse between members of the two Societies will tend towards the further development of the peat industry in all its branches. Personally I am interested in the production of peat for fuel. Others are interested in it from an agricultural point of view. I am interested in it also from that point of view, because at our little plant at Farnham our Superintendent has carried on some interesting experiments as far as agricultural products are concerned, and has met with more or less success.

There are two plants on a commercial basis in Canada—one managed by Mr. E. V. Moore of Peterborough, and the other by Mr. Carlsson and myself. I think that any of you who are interested in seeing fuel made will be well repaid in visiting either the one or the other. Mr. Moore has certain ideas of his own which I consider highly commendable. Mr. Carlsson, our own man, has put his ideas in our own plant, which is making peat fuel on a commercial basis. Both these plants it would well repay you to see. With these few words, and with the hope that our meeting will prove interesting and instructive to all, I bid you welcome.

Mr. Carl Kleinstueck of Kalamazoo, Michigan, asked if anything was being done in Canada in the production of peat litter. He said this had been imported from European countries into New York in considerable quantities. "I was in Holland in 1902, and the U.S. agent there had strict orders from the Secretary of State to give me all the help he could in investigating the peat litter industry. He welcomed me with open arms and said, "I am very glad that America is waking up—even if it is slowly—to the peat litter business. I have never been there, but I learn that right across from New York in New Jersey you have exactly the same peat as is being used for litter here in Holland, and if I appreciate the conditions you can raise that peat litter for $2 or $3 per ton." Hundreds of thousands of tons of this litter have been imported into New York and sold for as much as $15 a ton, and we wise Americans have been neglecting the very same thing which is right at our doors, and might be put on the market for $3 a ton. That is the way with us Americans, we must have things imported, and look stylish, while the good things at home go begging. It is very gratifying to me, however, to find that our imports of this peat litter have fallen from 185,000 tons a year to 90,000 tons. In another ten years I dare say we will have no use for imported peat litter."

Professor C. A. Davis of the U.S. Bureau of Mines, Washington, D.C., said he would like to know where Mr. Kleinstueck got his figures as to the importations of peat litter.

Mr. Kleinstueck:—From the Rotterdam agent of the Holland-American Steamboat Company, who is the American Consul there. When 185,000 tons were being imported, it was at the time when New York had horse cars. Besides that some large stock farmers used peat litter.

Mr. Julius Bordollo, Secretary-Treasurer of the American Peat Society:—There must be some mistake about large deposits of peat being across the river in New Jersey. There is no peat there fit for peat litter. We have been looking for several years to find such peat. There is some in Dutchess County, however.

Mr. Kleinstueck: Well, that is nearer than Holland.

Prof. Davis: Possibly it would cost less to take it across the ocean than it does across the river.

Mr. Kleinstueck: If Prof. Davis thinks there is no peat litter in this country, I challenge him to come to Michigan, and I will walk him tired on peat litter of sphagnum moss, ten to twelve feet deep.

Mr. Smyth: One meets with vegetable bogs all over the country. Mr. Carlsson who has examined bogs for us all over the country might perhaps let us know how often bogs have struck him as suitable for litter.

Mr. Carlsson: Such bogs exist more in the west than they do in the east, especially in Manitoba and Saskatchewan. In fact, in the Eastern Provinces, I have not seen one. None of them have any depth of any account that would make the peat of such a character as to be suitable for litter.

Mr. Bordollo: We are trying to start a peat litter industry in Dutchess County, but the difficulty is the question of cost. The freight to New York is $2 per ton. Delivery across the ferry to New York is 80 cents to $1.50 per car extra—and a car loads only 3 tons. Peat litter in Holland costs $5 a ton, and the steamship company sometimes when it has not got enough freight, will take it to New York for as low as from 50 cents to $1.50 a ton. Thus it is landed here for from $6.50 to $7.50 a ton. The thing here is how to get peat on the market cheap enough. The freight rate is enormous. If our peat deposits were 100 miles from New York, Holland would undersell us. All these questions have to be taken into consideration in order to make American peat litter a commercial proposition. The railroads should give special quotations on peat. At present peat is not listed, and they charge on the highest basis. When we complain of this, they say, "Ship some, and we will make a price." There are a great many difficulties to be encountered before we can get peat litter started. The thing is being tried out now, but it will be a few months before we can tell how cheap we can deliver peat. I think it can be done for $6 a ton, including freight.

Prof. Davis: There are very few bogs in the United States which I consider as a good proposition for peat litter, because you have to go over so much ground to get a sufficient quantity of the raw material to make it worth while. As to the bogs which Mr. Kleinstueck mentioned in Michigan, I spent three years

looking over the bogs of this country. As a general rule there is no sphagnum in them, and where there is sphagnum it is only about three or four feet thick. Below that we come to turf, and below that material which is better fuel than litter. While there are many bogs which have superficial deposits of sphagnum peat, there are few of any depth. There is another consideration which must be taken into account when discussing this question of peat litter. That is that the peat does not have to be sphagnum peat in order to make good litter. One of the most prominent European journals gives nine different kinds of peat which make good litter. In fact any peat not too much decomposed will make good litter. It is absorbent, a good disinfectant, and spongy enough to make good material for stock bedding.

Mr. Kleinstueck: I have experimented myself with live stock, and I find that any kind of peat makes excellent beds. The absorbent nature of peat makes it excellent for the prevention of sore feet. In fact those who use it consider that if they had to get peat litter at twice the price they pay for straw, it would still be preferable. It makes the stables sweet, and makes far better manure for land than straw, which does not absorb. It mixes readily with soil, and retains the ammonia far more readily than straw.

Prof. Davis said he had been talking with a man who kept a livery stable and who had been experimenting with peat litter. He had imported it from Holland and it cost him on the car $16 a ton, but he said he would use it in place of straw at $8 a ton if the peat litter cost $20 a ton.

Mr. G. Herbert Condict of Plainfield, N.J., said, down in Florida they thought it a crime to use peat for fuel, because it had so much more value as a fertilizer. The bogs there were under water for a great part of the time, in fact a great deal of the peat at one place was taken from the bottom of a lake 18 miles wide, 4 1-2 miles long and 5 to 15 feet deep.

Mr. G. Herbert Condict, of Plainfield, N.J., then read an instructive paper on "Utilization of Peat Tide Land."

DISCUSSION ON MR. CONDICT'S PAPER.

Prof. Davis referring to the value of peat as a fertilizer in Florida said: "With regard to the matter of soil, anybody who has been in Florida knows that there are thousands of square miles of what is apparently nothing but quartz sand. Where the water level is high good crops can be grown, but in other parts the vegetation that grows on these sandy soils is only a thin stubble in dry weather. Add vegetable matter in the shape of peat, and you get a mixture which enables the sand to hold to a great extent the water which comes in the form of rain, as well as that which is brought up from below by capillary action. Consequently, the people there, and especially the orange growers are anxious to get this relatively cheap organic material. This is a thing, however, which needs to be administered scientifically, and under conditions which can-

not be questioned, and I believe one of our functions as Peat Societies is to bring about this scientific study of the possibilities of the use of peat as a soil ameliorator. And as soon as we can get to it, I think the Societies should have in mind to find out just how much good the addition of peat does to quartz sand, and the conditions which would make this a commercial proposition.

Professor H. C. Thompson of the U.S. Bureau of Plant Industry, Washington, D.C.: I do not believe the use of peat for putting on sandy soils would be practicable except for crops of very high value. It is possible it would be on sandy orange groves, but I think it is entirely out of the question for the general farm crops grown in the South. The amount of this material necessary to have any effect on the water-bearing functions of the soil would cost too much on a soil where crops like cotton and corn are grown.

Prof. Davis: How do you know?

Prof. Thompson: I don't know, it is my belief. I am under the impression that the amount of peat necessary to put on these soils to have any appreciable effect on the water bearing capacity would be worth more than the cotton crop would amount to. The average farm does not get a return of more than $12 or $15 an acre, and I am sure it would take at least that much peat to do any good. Scattered over an acre of land, five tons of peat would be a mighty thin application.

Prof. Davis: You may be right. Still we don't know where peat can be used to the best advantage, we can only surmise.

Prof. Thompson: There is one other point I had not thought of. I have been in Florida quite a bit, and I remember that there are many truck farms where there are crops of from $500 to $1000 per acre, and on those it pays to put a high-priced fertilizer. I know some which have put on three tons of fertilizer per acre. If farms of this kind are deficient in humus it might pay to give them a dressing of peat.

Mr. Condict: It is among the farms which have high-priced crops that the demand exists at present.

Mr. Emslie: I am inclined to agree that for ordinary crops it would not pay to apply peat. I think the best use of peat, and that where we get the fullest value, is where we use it as a bedding material. It absorbs liquids. I have had considerable experience with peat litter and have found it much more valuable than straw.

Prof. Davis: The ordinary peat which comes from southern swamps, if not dried carefully is apt to dry in hard lumps as hard as soft coal. It needs to be aerated a good deal. It is not like normal peats. It is really an organic mud, and has to be handled quite differently from anything we get in the Northern peat deposits. The proof of all these things is not theory, but practice. You cannot sell farmers fertilizers that do not fertilize. If they try a fertilizer and get results, they will buy again, but you cannot persuade them to put their

money into stuff they have tried once without results, no matter how much their soil may, according to theory, need the stuff you recommend. There is an ancient prejudice, coming from our ancestors, that any dark soil is a good soil. Still you find some dark soils of which this is not true. Yet farmers will often buy a fertilizer that has a dark color, even if the color comes from charcoal. What we want to get is the value of these things in dollars and cents—how much peat it is necessary to put on land in order to get twice the crops the land produces now.

ADDRESS BY MR. B. F. HAANEL ON EUROPEAN PEAT POWER PLANTS.

Mr. B. F. Haanel, Chief Engineer of the Division of Fuels and Fuel Testing, Mines Branch, Department of Mines, Ottawa, gave a short address on "Peat Power Plants in Europe." He mentioned in particular the Mond by-product recovery gas producer power plant now in operation near Orentana, Italy.

This power plant is designed for burning 70 tons of theoretically dry peat—but at the time of his visit was burning only 30 tons of 30 per cent. moisture peat. As a reason for the low capacity at which this plant was operating, he cited the extreme difficulty experienced in manufacturing sufficient peat fuel to supply the plant during an entire year. This difficulty is due in part to the nature of the bog owned by the company and partly to weather conditions. The bog, which comprises an area of about 400 acres, is on an average only 1½ meters deep (about 5 feet) and is understratified by a layer of clay about 1 foot in thickness at about a foot from the surface. In order, therefore, to manufacture peat fuel, the top layer must first be removed and made into peat fuel and the underlying clay stratum removed before the remainder of the peat can be utilized. This is an expensive operation, even when labor is cheap, and in other ways militates against the production of large quantities of peat fuel.

The bog is covered during the rainy season with water which must be artificially drained by pumping—for this purpose a centrifugal pump operated by an electric motor is installed at some convenient place.

Excavation is performed entirely by hand, the material thus won being fed into Dolberg peat machines. Only a portion, however, of the total quantity of peat manufactured is air-dried—the larger portion being excavated, stacked on the field and transported from time to time to the plant by gasoline locomotives and cars, where are situated two Dolberg pulping mills. Before putting this peat through the pulping mills it is first subjected to a few pounds pressure in an ordinary hydraulic hay press which reduces the moisture down to about 75 per cent. The peat containing this per cent. of moisture is now fed into the pulping mills and finally after leaving is broken into small fragments which are then placed on racks and rolled into drying chambers.

For drying the peat, air mixed with the waste heat from the steam boiler plant, the heat of the gas engine exhaust, and in addition the heat generated by a special air pre-heater, in which a quantity of gas, equivalent in heating value to 8 tons of peat burned daily, is forced by a 40 horse power electric fan through five drying chambers in which, as previously stated, the peat is placed.

The moisture is reduced by artificial drying from about 75 per cent. to 30 per cent.

The thermal efficiency of this drying apparatus is about 45 per cent. and where such waste heat can be put to other purposes it is a question whether such a method has any value whatever. It is quite safe to say that many plants do not exist where so much heat can be afforded to be used in this manner.

The second plant visited was that of the German Mond Gas Company, situated near Osnabruck, Germany. This plant has a capacity of 3000 H.P. Ammonia recovery is carried on at this plant throughout the year and although the Company has not up to the present time been able to declare a dividend, they hope in a short time to be able to reduce certain expenses sufficiently to show a profit. The principal item of expense at this plant is the peat, which costs in the neighborhood of $3.00 per ton. Difficulty in properly draining the bog, together with the excessively wet season which prevailed last year, prevented a large or sufficient output of peat fuel of the required moisture content and at a reasonable cost..

The manufacture of peat fuel at this plant is performed by Strenge mechanical excavator and spreaders, and also Dolberg machines, which employ hand labour for excavation.

In connection with the exploitation of such power plants as those mentioned, I may say, success depends on the quantity of peat fuel containing over one per cent. of nitrogen which can be manufactured and delivered to the power plant at a reasonably low figure (say about $1.50 per ton). As the nitrogen content increases, the cost of the fuel can increase, or vice versa, if the cost of the fuel remains constant, the profits derived from such a plant increase with the increase in the nitrogen content.

At Oldenberg, a plant of 5,000 H.P. capacity was visited, operated entirely by steam in which the only fuel used was peat. It has been said that the government of that State in which the plant is situated, manufactures and sells the peat fuel to the power company for about $1.20 per ton. This company distributes the power generated, in the form of electricity, to neighboring towns and villages and to farmers. Ploughing, etc., are performed largely through the agency of electricity in this portion of the province of Oldenberg.

It has been said many times that a peat fuel containing 60 to 70 per cent. moisture can be profitably used in producers. Such statements are not correct. When the moisture content exceeds 35 per cent. the production of ammonium

sulphate falls off, as does also the quantity and heating value of the power gas generated. The best results are obtained with a peat containing not more than 30 per cent. moisture. This moisture content, however, is very difficult to obtain at some places and where this is so artificial drying of a portion of the peat supplied to the producer might have to be resorted to.

In conclusion, I may say that the successful exploitation of a power plant designed to gasify peat fuel with or without the recovery of ammonium sulphate depends, first, on the cheapness with which a large quantity of fuel can be obtained, second, a steady market for the power developed, and thirdly, in the case of the by-product recovery plants, on the quantity of nitrogen contained in the peat. As a final consideration, I wish to impress upon all those contemplating the erection of such plants, that the capital cost, and operating expenses must be kept as low as is possible.

DISCUSSION.

Prof. Davis said that at one place in Europe he saw a battery of eight boilers which were being run with fuel containing 60 p.c. moisture. He would defy anybody to distinguish this fuel from half-dry peat. In Germany it was called brown coal. Something like 800 h.p. was developed with that fuel, and with no other fuel or preparation. This was in a village near Cologne, and the plant was able to furnish electricity at 3 cents per Kilowatt hour. If they got these results from brown coal he saw no reason why half dry peat could not be burned in the same furnaces.

Mr. Haanel: In a producer plant the moisture has to be evaporated, and the remaining amount of peat goes to gas. The efficiency of such a system is exceedingly low when using 60 p.c. moisture. In a producer you cannot expect to use fuel of over 30 p.c. moisture and get efficiency.

Prof. Davis: These boilers were very long in comparison with coal boilers. The fuel was introduced into the back of the furnace, and brought forward by a mechanical stoker, and dried to a very considerable extent before getting into the combustion area. Of course a good deal of heat is used up in that way, but they certainly get excellent results. It took, however, one-third of all the fuel of the mine to run it. It showed me that the German engineers have gone into this matter of handling fuels in a way the United States engineers have not done. Our boilers are all designed to use nothing but high grade bituminous coal. There are few boiler makers who construct boilers in consideration of the fuel that has to be used in them.

Mr. Kleinstueck: Is there any brown coal of that value in this country?

Prof. Davis: None of our brown coal has anything like the structure or amount of moisture which this Cologne brown coal has.

Mr. Kleinstueck: I fail to see what connection this has with burning American brown coal. Even if the grates are of peculiar construction, you simply have to burn good fuel in order to dry out the water.

Prof. Davis: My point is that they burn brown coal of 50 or 60 p.c. moisture and make a fair value, if they cannot get better. They utilize waste heat that would otherwise go up the chimney.

Mr. Kleinstueck: I am sure this brown coal feels far more moist than it is. I had experience with it in my youth.

Mr. Arthur J. Forward, B.A., of Ottawa, Canada, Secretary of the Canadian Peat Society, presented a paper on "The Economic Utilization of our Peat Resources."

Mr. E. V. Moore, speaking of peat fuel production said that as the result of the work carried on by the Department of Mines during two seasons, Dr. Haanel had expressed the opinion that mechanical means must be utilized to supersede hand labour as far as possible. There were now two plants in commercial operation in Canada in which this idea had been developed to a very considerable extent. While the process and product of both these plants was substantially the same, they differed somewhat in the methods of handling the material, and the type of machines employed. These differences could be more intelligently discussed on the ground, and he hoped that as many as possible of the members would visit both plants, and see them in operation. He would reserve his remarks further on the subject for which he had been set down in the program until the visit to the Alfred bog.

EVENING MEETING

In the absence of Mr. John Wiedmer of St. Louis, Mo., his paper on "Dried Peat as Stock Food" was read by Mr. Julius Bordollo, Secretary of the American Peat Society, who then presented his annual report of the Society.

Professor Charles A. Davis of the United States Bureau of Mines gave a most interesting Review of the Peat Industry during the past season.

In the discussion which followed Mr. Smyth said he thought one of the principal things which should be considered by Peat Societies was not so much the immediate production of peat fuel as the conservation of our peat. He noticed in the report that mention was made of the peat producer plant put on the market by a company in the United States. He did not consider this should be given endorsation by a Society of the standing of the American or Canadian Peat Society. The machine in question had one feature which he did not consider very valuable. It excavated along the face of a trench continuously back and forth till it left a great lake behind. His experience in the production of peat was that if the season was wet with a great lake like that, they would have so much water that they woul dnot know what to do with it. In other words they would have to handle much more peat than was really necessary. He considered that to make peat properly they must excavate in a trench. The best machine was one which would dig a trench and leave dams. If a dry season

came they could break down the dams, while in a wet season, the dams would control the water. He did not condemn the machine, but for the reasons he put forward. he thought the Societies should be careful not to endorse any make of machine whatever.

Prof. Davis: I am very glad to have this point taken up. One of the principal objects of the "Journal" is to give place to discussion of this kind, and one of the most valuable things would be to have criticism of any paper in the "Journal." It must be understood that anything which appears in the "Journal" as a part of the proceedings of the Society is open to criticism by anybody. If they do not criticise, we assume they approve. I feel that while we should not endorse these things, it would be a very difficult matter to exclude a communication from any member of the Society, and the only real way in which we could show that the Society does not endorse it is for members to take it up and criticise it. Then there would be the same freedom for replies. We have a lot of things published in our "Journal" simply as a matter of record, and in the hope of promoting discussion. I think the "Journal" should serve the members, and being the responsible editor of the "Journal" of the American Peat Society, I am glad the point has been brought up.

Mr. Haanel: I should like to hear from men engaged in the production of peat as to the proper construction of peat machines.

Prof. Davis: That is a very important question, but I am afraid if we try to discuss it we shall be here all night.

Mr. Haanel: The mechanical excavation of peat is very important, and I should like some little discussion.

Prof. Davis: My experience is that there are peat bogs and peat bogs. On one bog you can use one type of machine and on the other another.

Mr. Haanel said he would like to know what was done when stumps or other obstacles were encountered in excavating peat. Were the machines capable of dealing with these, or were they put out of action for the time being? Also he would like to hear what were the objections to excavating peat with a steam shovel.

Mr. Smyth and Moore said these points could be better explained on the ground, and when Mr. Haanel visited the plants tomorrow the whole matter of excavation could be thoroughly explained.

Mr. Haanel said this matter was a very important one, for on the employment of mechanical methods the whole success of the industry would rest.

Prof. H. C. Thompson of the U.S. Bureau of Plant Industry, Washington, then gave an illustrated lecture on the results of the experimental work with muck soils in the greenhouses of the U.S. Department of Agriculture at Arlington, Va., this season. He said they considered they had been getting good results with certain soils and fertilizers in the greenhouses, but had had much better success with the use of peat, or as he preferred to call it, muck soil. He

showed many pictures of lettuce and cauliflowers grown in pure muck soil, or in various admixtures of muck soil and the ordinary greenhouse soil. These showed that muck soil was far better than anything else for greenhouse work. The best results were obtained with muck soil without the addition of fertilizer. The results of many experiments, with crops side by side on the various soils, and with check crops were given in tabulated as well as pictorial form.

AN INVESTIGATION AS TO PRESERVATION OF APPLES IN PEAT MULL.

By E. Nyström. Reported by Dr. Hjalmar von Feilitzen, Director of the Swedish Peat Society, Jönköping, Sweden.

(Translated from Mitteilungen des Vereins Zur Förderung der Moorkultur im Deutschen Reiche).

Experiments have been made for many years in the application of peat mull to preservation of fruit, and particularly in the fruit and vine culture school at Geisenheim investigations have been carried on.

As to the results, however, very little definite information was obtainable. We therefore decided in the autumn of 1911 to undertake an investigation with different sorts of apples at the experimental station of the Swedish Peat Society in Jönköping.

The experiments were very carefully conducted by the superintendent engineer, Mr. E. Nystrom. In the July number of our Journal he gave an interesting report of the results, illustrated by very good cuts. As this may be of value of those interested in peat in Germany, I will here set down the most important of these results.

The author rightly prefaces his report with the statement that thoroughly satisfactory preservation of fruits during any lengthy period can be secured only in cool rooms specially thereto adapted, where the temperature of the air and its moisture content can be properly regulated. Experience in storage of fruits under such conditions has shewn that the temperature must be held uniformly at a low point (from 0 to $+2°$ C.), and the relative humidity at about 80 per cent. In ordinary fruit storing rooms the temperature is often variable and especially in the early autumn altogether too high ($+8°$ to $+10°$ C or even higher). The result is that part of the fruit soon begins to rot, and even when it continues sound loses its fresh appearance and becomes wrinkled and unsightly. In order to sustain in some measure the keeping qualities of fruits, and to hinder too great evaporation of water and consequent shrinkage, it is sometimes recommended to keep them in chaff, bran, peat mull, cork dust, or the like.

At our experimental station an experiment was made on a small scale with three kinds of apples ripening at different times. and of different keeping qualities. These were:—

Gravensteins, ripening in Sweden in November, and keeping by ordinary methods until February.

Winter Goldpearmains, ripening in December, and keeping until March, and

Ribstons, ripening in January and keeping until May.

Of each sort three rows of about 50 apples of equal size were used.

Row A.—The apples were laid in a single layer on a shelf in the cellar storage room.

Row B.—The apples were carefully laid in peat mull so that each was separated from the others by a layer of the mull.

Row C.—The apples were wrapped in silk paper and laid in peat mull.

The average temperature in the storage room was in

December	+ 8.5° C.
January	+ 3.9° C.
February	+ 4.7° C.
March	+ 7.2° C.
April	+ 7.2° C.
May	+ 9.0° C.

The highest temperature was on December 5th, + 10° C., the lowest on February 2nd,—0.5° C. The humidity of the air varied between 60 and 80 per cent. The storage room was far from ideal for the preservation of fruit. The temperature was too much dependent on the outside temperature and generally too high, and the air was often too dry.

The apples lying on the shelf soon began to wrinkle, and were more or less attacked by rot. The experiment with the Gravensteins was continued until February 21st, and with the other two sorts until May 10th.

The following were the results:—

(1)—GRAVENSTEINS.

Time of keeping from December 5th, 1911, until February 21st, 1912.

In each row under observation there were placed 43 perfectly sound apples of equal size.

Method of Preservation.	Weight at the beginning of the experiment	Weight at the end of the experiment	Loss in weight
	Gr.	Gr.	Gr.
(1)—On the shelf	3808	3035	773
(2)—In the peat mull	4018	3723	295
(3)—In silk paper and peat mull	3810	3534	276

Fig. 1
Gravensteins kept in single layer on shelf. Appearance after 2½ months.

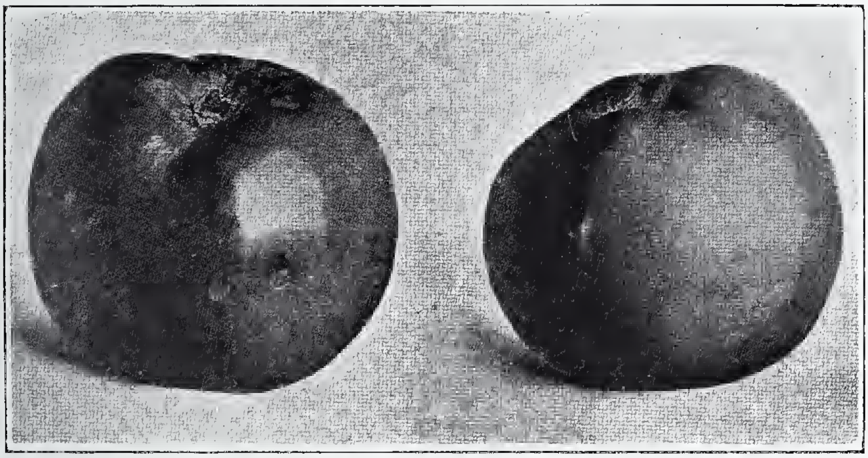


Fig. 2
Gravensteins kept in peat mull. Appearance after 2½ months.

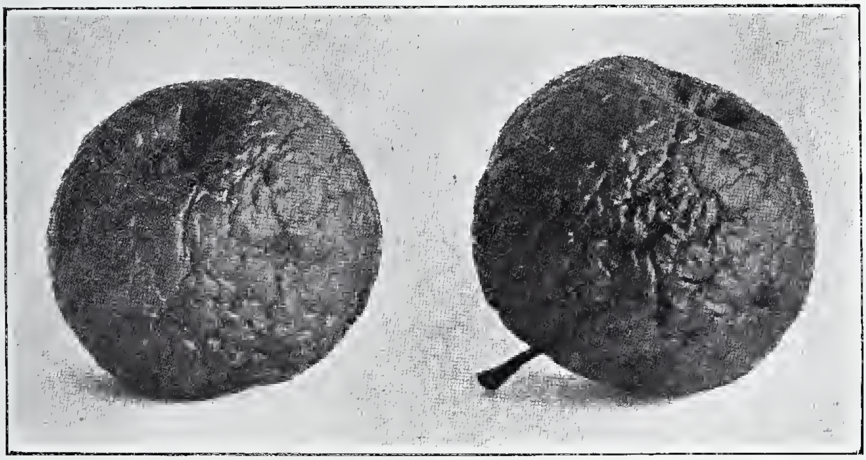


Fig. 3
Winter Goldpearmains kept in single layer on shelf. After 5 months.

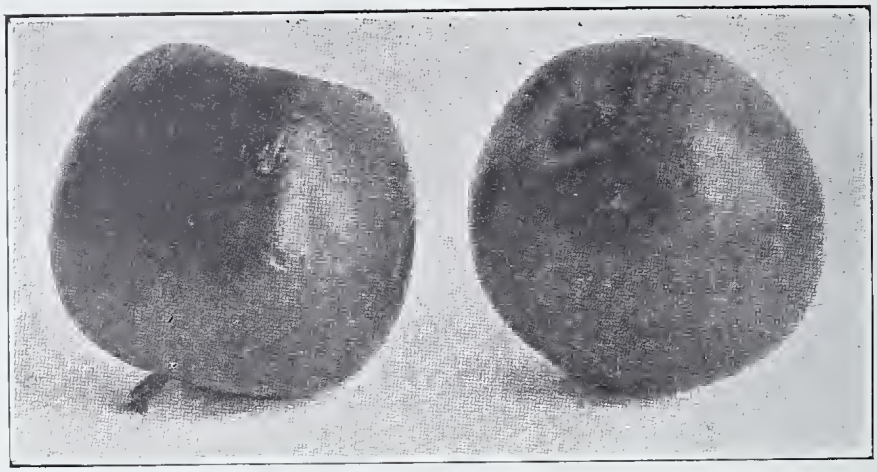


Fig. 4
Winter Goldpearmains kept in peat mull. After 5 months.

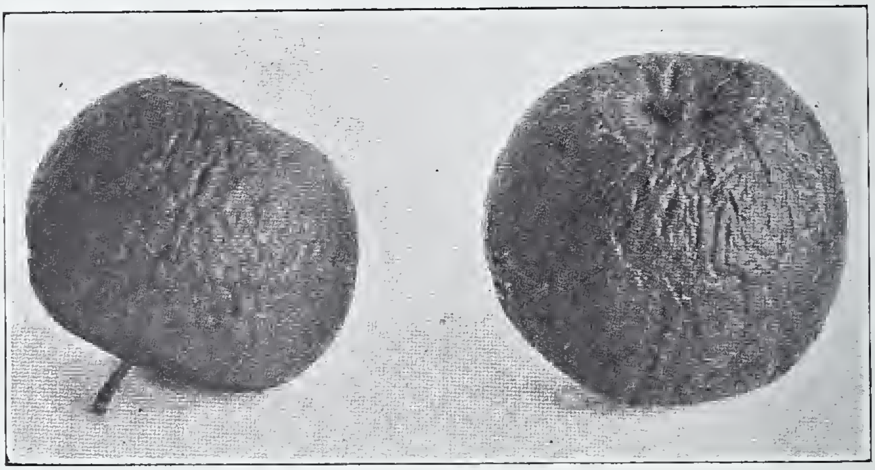


Fig. 5
Ribstons kept in single layer on shelf. After 5 months.

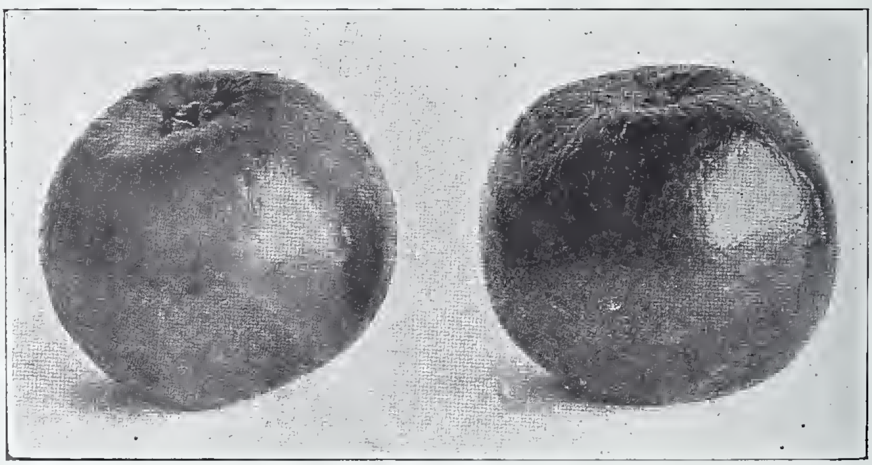


Fig. 6
Ribstons kept in peat mull. After 5 months.

At the close:

Sound No.	Attacked by Rot No.	Loss of Weight Per Cent.	Spoiled by Rot Per Cent.	Total Loss during storage by loss of Weight and through rot. Per Cent.
(1)— 6	37	20.3	86.0	86.5
(2)—23	20	7.3	46.5	49.1
(3)—23	20	7.2	46.5	49.1

(2)—WINTER GOLDPEARMAIN.

Time of keeping from December 5th, 1911, until May 10th, 1912.
In each row 45 sound apples of equal size.

Method of Preservation.	Weight at the beginning of the experiment Gr.	Weight at the end of the experiment Gr.	Loss in weight Gr.
(1)—On the shelf	2303	1584	719
(2)—In the peat mull	2518	2203	315
(3)—In silk paper and peat mull	2388	1985	403

At the close.

Sound No.	Attacked Rot No.	Loss of Weight Per Cent.	Spoiled by Rot Per Cent.	Total Loss during storage by loss of Weight and through rot. Per Cent.
(1)—26	19	31.2	42.2	59.8
(2)—35	10	12.6	22.2	30.5
(3)—33	12	16.9	26.2	39.9

(3)—RIBSTONS.

Time of keeping from December 5th, 1911, to May 10th, 1912.
In each row 45 sound apples of equal size.

Method of Preservation.	Weight at the beginning of the experiment Gr.	Weight at the end of the experiment Gr.	Loss in weight Gr.
(1)—On the shelf	2417	1940	477
(2)—In the peat mull	2758	2482	276
(3)—In silk paper and peat mull	2789	2495	294

At the close.

Sound No.	Attacked by Rot No.	Loss of Weight Per Cent.	Spoiled by Rot Per Cent.	Total Loss during storage by loss of Weight and through rot. Per Cent.
(1)—26	19	19.7	42.2	54.7
(2)—39	6	10.0	13.3	24.0
(3)—32	13	10.5	28.9	37.9

As shown in the preceding tables the preservation in peat mull reduced the loss through rot by one-half and the loss of weight by one-half or at least one-third. That the percentage of rot in the apples kept in the peat mull was apparently considerable, was due probably to the fact that the peat mull used was not dry enough. It contained at the time the fruit was stored 37.8% water (good mull should not contain more than 25, or at the highest 30% of moisture.) Apparently it is also due to humidity of the mull that the apples wrapped in silk paper showed a higher percentage of loss from rot than those without paper. Especially noteworthy was the difference in the appearance of the apples. Those kept on the shelf were very much wrinkled, while those in the peat mull retained their fresh appearance and their smooth shining surface. The preservation of fruit in peat mull can therefore be recommended where it is handled in small quantities and good fruit storage rooms are lacking. But special care must be taken that the peat mull is well dried and that the storage room is keep cool but free from frost.

PEAT FUEL PRODUCTION IN QUEBEC, 1912.

The Peat Industries, Ltd., has now passed the experimental stage and is producing peat fuel on a commercial scale. This Company has secured an area of 1,200 acres of excellent peat bog, at Ste. Brigide, five miles from the town of Farnham. The work done on this bog by the Peat Industries, Ltd., comprises a main drainage ditch, 1,500 feet long, 10 feet deep, 7 feet at the top, 2 feet at the bottom; over 6,000 feet of smaller ditch 3 feet deep and 2 feet wide.

The equipment in the field consists of a peat machine of the Anrep type, but modified to meet the local conditions. It is worked by a 45 H.P. gasoline egnine which operates the excavator, the macerator, the endless cable to which are clamped the cars, and the spreading machine.

The plant has a capacity of 40 tons of dried peat in ten hours.

The peat is entirely air-dried, as it is now recognized that this is the only practical and economical way of producing peat-fuel. The dried peat is conveyed to the Central Vermont Ry., which crosses the bog, by small cars running on 24 in. gauge tracks. The plant requires seven men for its entire operation.

The peat was sold in 1912 at the rate of $4 a ton f.o.b. Ste. Brigide.

It is to be regretted that the whole of the summer of 1912 should have been extremely unfavourable to the production of air-dried peat. The continual rains greatly interfered with the operations, but it is hoped that the 1913 campaign will be a successful one.—(Extract from Report on Mining Operations in the Province of Quebec during the year 1912, Mines Branch Department of Colonization, Mines and Fisheries, Quebec).

Journal of the Canadian Peat Society

Published Quarterly by

THE CANADIAN PEAT SOCIETY

22 Castle Building, Ottawa, Can.

Subscription Price (4 numbers) **$1.00**

Advertising rates will be furnished on application.

Remittances may be made by cheque (payable at par in Ottawa), draft, money order, or postal note to the Secretary Treasurer of THE CANADIAN PEAT SOCIETY, 22 Castle Building, Ottawa, Can.

EDITORIAL.

Several interesting papers read at the Joint Meeting of the American and Canadian Societies in Montreal on August 18th, have unavoidably been held over until our next issue.

Owing to the dry season extensive bush fires occured through Ontario and Quebec during August, and large areas of the bogs at Alfred and at the Mer Bleu near Ottawa were burned over. On the day of the visit of the Peat Societies to Alfred, August 19th, the operation of the plant was cut short by the employees being called off to fight fire which threatened the buildings on the bog.

A COMBINATION PEAT FUEL.

We are in receipt of a letter describing a fuel composed of peat combined with chemicals not designated, which has been made on a very small scale experimentally in one of the Eastern States. The claims made for the fuel are that the chemicals cause it to give intense heat, that it burns slowly, and produces very little smoke, etc. It is stated that fuel manufactured according to the formula can be placed upon the market at a good profit below one-half the price of coal. An ordinary brick machine is said to be all the machinery needed, and it is claimed that by this process fuel can be made through the entire year. The writer says, "To instal a machine and build a shed ready to manufacture this fuel ought not to cost in excess of $500."

The method of manufacture, which has been carried on only upon a very small experimental scale, may be described as follows:—

The peat and chemicals are mixed in a mixer, the mixture pressed and cut into block of any required size, and these blocks dumped in loose piles to dry. It is claimed that, "It takes care of itself in the piles and dries quickly and becomes hard."

Probably every claim made for this fuel has been made hundreds of times before. As pointed out elsewhere in this issue, prior to 1902 there were some 400 patents issued in the United States on combined or artificial fuels, but not one of these had proved commercial. This affords strong presumptive evidence that addition of crude oil or chemicals to peat is not likely to prove commercial unless perhaps under exceptionally favorable circumstances. The statements made as to possibility of working through the entire year, and low cost of plant required are extremely misleading, and based apparently on misconception of the problems involved.

Raw peat contains roughly 90% of water. This water content must be reduced to approximately 25% to make an efficient fuel. In other words, 10 lbs. of raw peat will produce 1 1-3 lbs. of peat fuel, 8 2-3 lbs. of water having to be got rid of. Experiments on a small scale are apt to be very misleading.

It is a very simple matter to produce 1 1-3 lbs. of fuel from 10 lbs. of raw peat, or even to produce 133 lbs. of fuel from 1000 lbs. of raw peat, without any elaborate equipment. Operation on a commercial scale is a very different thing altogether. To produce 50 tons of fuel in a day of 10 hours, it is necessary to raise from the bog, press, cut, handle and rehandle say 375 tons of raw peat in that time or 37½ tons per hour. This involves the use of mechanical excavators, extensive drying areas, and machinery for distributing and spreading.

Experience shows that the peat blocks must be turned, and the only practical method of drying yet discovered is by exposure to the influence of sun and wind during the summer months.

We cannot emphasize too strongly that there is no difficulty whatever in the way of production of an excellent fuel from peat by the simple process of

maceration and air drying. Millions of tons are manufactured yearly by this method in Europe. The whole problem in this country is to produce sufficiently large quantities at low enough cost to render the operation commercial. The real obstacles in the way of success are the short season, the high cost of labor, and the cost of marketing the product. During the past three years great advancement has been made in Canada in the way of improved mechanical appliances for excavating and spreading the peat, and it is along this line that the true solution of the problem lies.

PEAT POWDER—A NEW FUEL.

The fuel question is in spite of everything, one of the principal economical questions of the world, and even if all obtainable water power is ultimately utilized, the demand for fuel will remain unchanged or increased.

Attention has for a long period been fastened on the turf-mosses, of which inexhaustible supplies are found, but the turf cannot without improvement be used for burning purposes, and all experiments to produce from turf a satisfactory fuel has met with great difficulties. It has either become too poor or too expensive, or both combined.

During later years a new method has been tried, viz., the production of powdered peat, and with this there will be a radical change in the problem. The excellence of the new method lies in the fact that it can be entirely worked by machinery. With very little help great quantities of turf can be taken up and dried at a very low price, and since the raw material can be obtained so cheaply, it is possible to give it a satisfactory improvement.

As the principal question with the peat industry is that of leaving as little water as possible in the peat and as this of course can be best done when it is in a powdered state, which at the same time is the ideal form of fuel, the new method very ingeniously combines these two forms.

Experiments with both stationary and movable boilers have proved that with peat powder a larger effect is obtained than when firing with coal. Another fact is, that when firing with peat powder there is no smoke or sparks. This is a great advantage for locomotives frequently cause fire to break out along the line.

As the foremost experts have proved that the peat powder can be made at a price of Kr. 8.50 ($2.27) per ton and the several trials have proved that 1 3-10 tons of peat powder equals 1 ton of first class coal, the price of the latter must necessarily be lowered to Kr. 10.75 ($2.87) per ton in order to compete with the peat powder.

In addition as regards boilers, the peat powder can be used to advantage in the clay, glass, cement and iron industries. With direct firing, the highest temperature, which any of these industries require, has been obtained.

The new method has been invented and worked out by Mr. H. Ekelund, of Jönköping, who has spent more than twenty years on this study. The method is in use by the "Aktiebolaget Torfs Factory" at Back in Smaaland, Sweden, which produces about 15,000 tons per year, and which has obtained excellent results. Even the most sceptical have after a thorough study of the results had to acknowledge that the matter is no longer an experiment but a method worked out in every detail, and already in practical use. Several of the railways in Sweden have entirely gone over to using powdered peat for their engines. Foreign countries have also shown much interest in this new method. In Finland there is a large plant for manufacturing powdered peat fuel being built to be used by the Finnish state railways. For several other countries negotiations are being carried on for the selling of the patent.—(Extract from report by C. E. Sontum, Canadian Commercial Agent at Christiana, Norway—Weekly Report of the Department of Trade and Commerce of Canada, Sept. 8th, 1913).

NOTE.—Experiments in the use of powdered peat as a fuel were successfully carried out in Canada several years ago by C. A. Sahlstrom of Jönköping, Sweden.

A small plant was erected on the Brockville bog in 1905 to demonstrate the drying and carbonizing method and apparatus devised by Prof. Sahlstrom. The peat, collected from the bog by harrowing and raking in heaps, was dried in the form of powder, and afterwards ground to a fine dust in a small mill. The dryer and carbonizer were so designed that the necessary heat for their operation could be supplied by blowing this finely powdered peat into the fire box underneath the carbonizer. A number of trial runs were made and the peat powder was shewn to be a most efficient fuel. Operations were discontinued owing to lack of capital.

FUEL BRIQUETTING IN THE UNITED STATES.

The total quantity of briquetted fuel made in the United States in 1912, according to a report by Edward W. Parker, was 220,064 short tons, valued at $952,261. Nineteen plants contributed to the production, of which nine in the Eastern States produced 107,181 tons valued at $370,841, seven in the Central States produced 89,714 tons valued at $400,624, and three on the Pacific Coast produced 23,169 tons valued at $180,796. Seven plants used anthracite culm, nine used bituminous slack, and one used peat.

The report states that vast and almost untouched areas of lignite in North Dakota and Texas contain enormous supplies of fuel that European experience has taught is well adapted to briquetting. It also says with regard to peat:

"The large areas of peat beds in the United States are also available as a source of raw material. They are generally remote from the coal fields, and the briquetted fuel from peat, when properly prepared, makes an excellent substitute for coal. The peat now produced in the United States is used for stable litter, fertilizer, etc. None is used raw for fuel."

NOTE.—From the fact that the one company interested in the briquetting of peat is reported to have manufactured only 250 short tons during the season, it may be readily inferred that operations have not reached a commercial stage. Several companies were formed in Canada a few years ago to manufacture peat briquettes but none of them were successful.—Ed.

Production of Briquettes in the United States in 1907, 1908, 1909, 1911 and 1912, in short tons:—

Year	Quantity	Value
1907	66,524	$258,426
1908	90,358	323,057
1909	139,661	452,697
1911	218,443	808,721
1912	220,064	952,261

PEAT PRODUCTION SMALL.

While the United States is the richest country in the world in the deposits of peat, little active work is done in mining or digging it. So far as is known very few of the peat-fuel plants established have gone beyond the experimental stage and many of them have never been equipped with essential machinery.

Reports from all known peat-fuel plants in the United States, according to an advance chapter from "Mineral Resources, 1912," on the production of peat in 1912, by Chas. A. Davis, show that with one exception they were idle during the summer of 1912.

The output of peat fuel was reported as about 1300 tons, valued at $4550. All this peat was sold. A copy of the report on peat may be obtained free on application to Director, U.S. Geological Survey, Washington, D.C.—Power. September 2, 1913.

REPORT ON COAL AND POWER INVESTIGATION.

By R. O. Wynne-Roberts, M. Inst. C.E.

(Printed by Order of the Legislative Assembly of Saskatchewan, 1913.)

This exhaustive report recently issued by the government of Saskatchewan contains much valuable data as to the quantity, location and quality of lignite deposits in that Province, methods of transforming lignite into power, and transmission of same, local markets for power, etc.

The general problem sought to be solved is thus stated:—

> "The Province of Saskatchewan has developed in a remarkable manner during the last few years and there is every prospect for a continuation of its development in the future. There are, however, conditions which will tend to retard its progress and development and those are mainly the cost of fuel and therefore power, and cost of living and therefore labour. The extraordinary expansion of agricultural industry and the great extension of railways now create an increasing demand for labour but in time this will be adjusted. The natural sequence to railway expansion and Provincial progress will be the establishment of mills, factories, electro-chemical works and other forms of enterprise which will need cheap fuel and power. Where industries are located these elements must be found or such enterprises will decay, to the great disadvantage of the community. A growing population ncessarily calls for various local industries to provide for its daily wants, and at the cheapest rate, and this tends to make the variety of local industrial enterprises interdependent and mutually helpful.
>
> The cost of imported fuel renders it commercially difficult to run industries in this Province unless the price of the products are high and this directly or indirectly reacts on every other form of provincial enterprise. Virginia coal which costs less than $1 per ton at the mine, costs about $8 per ton in Regina . Pennsylvania anthracite costs about $2 at the mine, whereas in Regina it costs $12 per ton. More or less the same costs are prevalent through the province. Alberta coal, of course, costs less, but more must be consumed to obtain similar results. The cost of railroad transportation constitutes the bulk of the increase in the price of coal in this Province.
>
> As is well known, Saskatchewan has no local supply of bituminous coal and up to the present by far the greater part of fuel consumed is imported either from the States or from the vicinity of the Rocky Mountains, both of which entail long haulage and heavy freightage.
>
> It is, however, an interesting coincidence and a consideration of great economic importance that in those parts of North America and more particularly the central Prairie Provinces, which are so remote from the fields of superior coal, lignite—and in some parts peat also—is found in large quantities; and it needs only to ascertain the best method of utilising them to obtain the best results, when the absence of superior coal will be compensated by the presence of fuel which will cost less for equal power."

Some interesting facts are stated bearing on the increasing field for employment of low grade fuels and the prospective use of lignite and peat for power production. It is pointed out that in Great Britain attention is being paid to coal wastes which were formerly dumped over the tip as useless. The most inferior of slack and washery-refuse are now being consumed in considerable quantities for the production of cheap power. The North-East Coast Power System has seventeen generating stations of which six are coal-fired, and the remainder waste heat stations, where steam for generating electricity is obtained either from exhaust steam or by steam raised by blast furnace gas, or

from the waste heat and gas from coke-ovens, the total horse power connected amounting to nearly 200,000.

In Germany science and art have been so developed in the utilization of low grade fuels such as lignite, peat, etc., that immense power plants are now in operation and others projected.

The value and consideration of cheap fuel and power in the United States are being more fully appreciated each year. The result is the establishment of power plants where formerly it was not thought possible, and this is opening out new industrial centres to the advantage of all concerned.

"As an indication of the magnitude of the use made of cheap gas in the States, the following figures may serve to emphasize the foregoing statements:

Producer gas for gas engines, heating open-hearth furnaces, and gas retort benches,	
for power only	35,000,000,000 cubic feet
for heating only	100,000,000,000 cubic feet
Blast furnace gas	2,900,000,000,000 cubic feet
Natural gas	480,707,000,000 cubic feet

Lignite or brown-coal, whether considered physically or chemically, may be justly regarded as a substance intermediate between peat on the one hand and bituminous coal on the other. The lignite fields of the Western Provinces are estimated by D. B. Dowling of the Geological Survey to contain over 100,000,000,000 tons. Lignite, when exposed to the atmosphere, crumbles or disintegrates, tending to waste in use, and its mining is at present more or less a winter industry. It is hoped by means of briquetting to enable the industry to be carried on the year round. The production in Saskatchewan in 1911 was 206,779 tons, of which 104,000 tons were consumed in the province, representing 17% of the total fuel consumption.

It is stated that Berlin (Germany) alone consumes an average of over 100,000 tons per annum, constituting from one-third to three-quarters of the total coal consumed.

The Saskatchewan lignite has proved excellent for use in the down draft producer.

"Peat is capable of producing excellent illuminating gas by distilling it in cast iron retorts, heated from the outside." "The distillation of peat for illuminating gas manufacture must be carried on at a red heat, or higher, in order to decompose the heavier hydro-carbons into permanent gases that will furnish substances to brighten the flame when the gas is burned." "If distillation is carried on at temperatures that are too low the gas contains more carbon dioxide and gives a colourless flame when burned. The percentage of carbon dioxide may reach 25 to 30 per cent and even more if the peat used is not thoroughly dried when it is put into the retort. The evaporation of the water present lowers the temperature of the gases formed so much that the carbon dioxide developed is not decomposed." The quantity of lime necessary for the removal of carbon dioxide is great, and this has operated against the use of peat as a source of illuminating gas. Peat is stated to be capable of yielding from 8,900 to 10,400 cubic feet of gas per ton of 2,000 pounds. "That it might be used in properly designed and constructed plants in regions remote from supplies of suitable coal and where peat is common is clearly indicated."

"Lignite has already been described as a substance intermediate between peat and bituminous coal, and what is claimed producible from peat may be reasonably claimed for lignite."

"A Mond gas installation worked on Italian peat with a moisture content of 45 per cent., produced per ton of dry peat 60,000 cubic feet of gas, having a calorific value of 166 B.T.U. per cubic feet, and also 115 pounds of sulphate of ammonia, which is an excellent fertiliser.

A 7 foot diameter Kerpley gas producer has been installed at Pionbino, Italy, to gasify lignite having a heat value of 9,350 B.T.U. and this produced gas possessing a heat value of 161 B.T.U. per cubic foot.

At least 250 gas producers of one make have been installed to gasify lignites in Europe."

Several of the conclusions with regard to lignite arrived at by Mr. Wynne-Roberts and recommendations made to the government of Saskatchewan are equally applicable to the extensive peat deposits in several of our provinces, e.g.

CONCLUSIONS.

"The large quantities of workable lignite deposits in the Province of Saskatchewan can be utilised at the coal centres for the production of power and its distribution in parts of the province.

The generation of electrical power at such coal centres is both a practicable and commercial possibility, and its distribution at a low rate per kilowatt is feasible, if the larger municipal authorities will co-operate by taking currents in bulk. It was the co-operation of the municipal authorities at the initial stage of the development that made the North East Coast Power System in England the huge success it is.

The manufacture of lignite gas at a gas works located on the coal fields is also a practicable and commercial possibility. The quality of this gas will not be equal to coal gas, but it can be supplied at a much lower price per 1,000 cubic feet if the larger municipal authorities will co-operate in taking the same in bulk. This gas will be useful for power and heating purposes and if it is required to be of a higher illuminating value, it can be easily enriched by the authorities at small expense.

It is not possible by means of imported fuel consumed at individual power stations to produce as cheap electricity or gas supply as can be done in bulk at the coal centres and delivered same to the points of consumption."

RECOMMENDATIONS.

That further and more extended investigations be made with the view of promoting the use of lignite as fuel and thereby the development of the mining industry in Saskatchewan.

That experiments be made to find out the most satisfactory method of consuming lignite for domestic purposes.

That complete analysis be made of lignites found in this province.

That the lignite fields be explored to ascertain their area, extent, positions and values.

That the railway companies be asked to give preferential rates for local lignite as is done in Texas.

That government institutions use lignite where found economical."

USE OF PEAT IN EARTH CLOSETS.

Among other uses to which peat mull or peat dust may be advantageously put is its employment in dry earth closets or outside privies. It is a well known fact that very unsanitary conditions are found at many summer resorts where a number of people congregate for several months during the hot season, and where there is an absence of sewers or other efficient means of disposing of excreta. Many typhoid cases which develop in our cities during the early fall

months are directly traceable to the unsanitary surroundings in which some part of the summer was spent.

There can be no doubt that much of the danger, to say nothing of the discomfort, of such conditions could be obviated by the use of peat dust in closets. Several years ago a considerable quantity of peat dust was brought from Brockville and distributed at Britannia Bay, a summer resort near Ottawa, for this purpose. The results were very favorable, and a demand was established, but owing to inability to secure a regular supply its use was discontinued.

Peat dust is a powerful deodorant, and its use in a closet or privy entirely does away with disagreeable odors. Moreover the contents of the closet where it is used can be removed without offence and are in a condition to be utilized on the soil.

A special earth closet or commode for the use of dry peat dust or mull was devised several years ago and patented by the late Thomas Macfarlane, Dominion Analyst. Its essential feature is a moveable shelf on which the peat absorbent is placed and the excreta received. The peat can be used several times before becoming too moist for continued use.

Several other closets for the same purpose have been invented from time to time, and the construction of a suitable apparatus is not beyond the skill of any ordinary carpenter. Now that we have several parties operating in the production of peat fuel and it is to be hoped that this mode of utilizating peat may receive the attention it deserves. It is well worthy of consideration by the health authorities, especially in the districts surrounding our cities which though thickly populated do not enjoy city conveniences.

EXPERIMENTS BY THE LATE THOMAS MACFARLANE, DOMINION ANALYST, IN THE USE OF PEAT IN CLOSETS.

A series of experiments were conducted several years ago by the late Mr. Macfarlane as to utilization of human refuse, an account of which is embodied in a paper entitled "On the Loss of Substances useful as Plant Food sustained in Moss Manure" read before the Royal Society of Canada in 1904 (Section 3, 1904, No. 11).

A closet (such as already above described) was charged in the spring of 1903 with 20 lbs. moss litter, and the product was removed, weighed and sampled in October. **The removal and subsequent handling of this product was easily accomplished and without the slightest annoyance to anyone. Even in the drying of the sample there were no disagreeable emanations, thus affording another proof of the efficiency of the moss litter as a deodorant.** The product for the six months weighed 70 lbs., and part of it lost in drying, an amount

equivalent to 62.6% water, or 43.8 lbs. on the 70 lbs. The dried sample representing 26.2 lbs. assayed as follows:—

Nitrogen	4.88	per cent.
Phosphoric Acid	4.79	per cent.
Potash	3.12	per cent.

A subsequent experiment made with a peat commode placed in a small apartment upstairs in a dwelling house, gave the following results:—

"The use of this commode began on the 1st November, 1903, and on the 31st January, 1904, the contents were removed and sampled, both use and removal taking place without the slightest annoyance to the house inmates. It was charged with 15 lbs. moss litter at the beginning of the experiment, and the product weighed 60 lbs. It smelt slightly of ammonia, and was alkaline to litmus paper, and therefore previous to drying the sample of 435 grammes, 5 cubic centimetres of oil of vitriol mixed with 45 c.c. of water were added to prevent loss of ammonia. The loss in drying amounted to 67.5%, so that had the 60 lbs. of product been dried like the sample it would only have weighed 19.5 lbs. The analysis of the dried sample gave:

Total Nitrogen	3.33	per cent.
Phosphoric Acid	3.52	per cent.
Potash	1.05	per cent.

These results showed a great deficiency in nitrogen content, and as 84% of the nitrogen in human excreta is contained in the urine, laboratory experiments, as described in the paper, were undertaken to ascertain the cause of the loss. The results obtained showed that almost the whole of the nitrogen contained in urine is lost when the latter is absorbed by moss litter, and its water allowed to evaporate spontaneously with unlimited access of air.

"A series of experiments was next undertaken for the purpose of retaining the nitrogen as ammonia by mixing with the moss litter substances containing salts and acids capable of fixing the volatile alkali. The urine was absorbed by the moss litter, and allowed to dry gradually as above described. It is unnecessary to give all the particulars regarding these trials, but it may be stated that in all cases sufficient of the added substances was used to effect the retention of the ammonia if all the nitrogen of the urine had been developed in that form. The results were as follows:

	Proportion of Substances to Urine as 1 to	Loss of Nitrogen
A mixture of equal parts of bone, superphosphate and double manure potash salt	6.11	16.0 per cent.
	8.91	24.1 per cent.
	3.36	31.1 per cent.
Sulphate of magnesia	6.75	38.5 per cent.
Land Plaster, ground	6.32	28.1 per cent.
Land Plaster, ground	10.76	60.7 per cent.

These results lend confirmation to the idea already expressed that urea in decomposing under the above described circumstances is not all resolved into carbonic acid and ammonia, but that a varying quantity of nitrogen escapes in the free state. The presence of acid and neutral substances capable of fixing ammonia does not prevent this, and the development of nitrogen seems to be owing to the excess of air which was used in these experiments. This unlimited access was of course necessary for the elimination of moisture, an advantage, however, which cannot possibly compensate for the loss of nitrogen. There cannot be any doubt that in the ordinary treatment of barnyard manure the same influences are at work, and that in spite of the presence of substances capable of retaining ammonia, losses of nitrogen take place when the manure heaps are allowed too great a degree of porosity."

While the results recorded by Mr. Macfarlane are largely of a negative character, there is no doubt room for further research and experiment to ascertain the physical conditions necessary to the most efficient retention of nitrogen in using moss litter.

PATENTS RELATING TO PEAT ISSUED BY THE CANADIAN PATENT OFFICE.

No. 147434—April 22nd, 1913.

The National Fibre Products Co., Assignee of Bernard Granville, New York. Method of Recovering Peat From Peat Bogs.

The invention has for its object to secure economy of excavation and separation of the fibre contained in peat with a minimum of breakage of the fibre with a view to its production for manufacture of paper and other articles. By directing a powerful stream of water on the peat in the bog it is disintegrated, the fibres washed out and held in suspension in the water used for cutting. After the water is drained off the fibre is subjected in turn to weak alkaline and acid solutions, as described, causing it to shrink and solidify and adding to its strength. Water is forced at a pressure of from 40 to 200 lbs. through a pipe to a standard hydraulic giant located preferably at the deepest part of the bog.

Claim:—The herein described method of excavating and separating peat fibre from the other constituents of the bog, the same consisting in applying to the peat as it lies in the bog a powerful stream of water, thereby cutting the peat and forming a body of water carrying the fibre and other constituents from said body and separating the fibre therefrom, substantially as described.

No. 148778—June 17, 1913.

Ernest August Perrson, Emmaljunga, Sweden.

Peat Conveyor.

The mill is arranged on the frame of a portable engine moveable on rails along the bog. Two endless wire ropes driven by means of a bevel gear system are carried over pulleys fastened to the framework of the engine and run to a station truck consisting of a frame resting upon wheels and carrying two pulleys in swivel bearings. The station truck is adapted to be moved on rails in a direction transverse to that of the wires, and may be at any convenient distance, as much as 200 metres to advantage. The wires are so driven that their upper surface moves from the engine, and are supported and kept in position by specially designed portable horses. The peat as it comes from the mill is fed on to boards which as they are loaded are pushed in succession on a vertically moveable roller conveyor whereby they are deposited on the moving upper portions of the wires, and carried along the wires to the portion of the drying ground where they are to be unloaded. The empty boards to be filled are carried back on the lower portion of the wires. Circular knives suitably placed on the loading device cut the peat into pieces of convenient size.

149531—July 29th, 1913.

T. Rigby, Dumfries, Scotland.

Method and Apparatus for Gathering and Transporting Peat.

Assigned to the Peat Coal Investment Co., Ltd.

According to this invention the peat is cut from the bog and while containing about as much water as in its natural state in the bog, is subjected to maceration until reduced to a pulp of watery fluidity, whereupon it is pumped through a pipe line.

It is stated the applicant is the first to make feasible this mode of conveyance of peat from the bog, and his invention is based on the discovery that if excavated peat be disintegrated sufficiently to destroy its fibrous structure it may be conveyed as described without addition of extraneous water, the mass becoming sufficiently fluid by adequate disintegration.

The necessary equipment consists of an excavator disintegrator and pump suitably disposed on pontoons or otherwise, a fixed pipe line-line, and a flexible pipe between the pump and the fixed fixed point in a pipe-line, so that a more or less wide cutting can be made without any alteration in the pipe-line being rendered necessary.

"Claim:—1. A method of gathering peat according to which the peat is excavated from the bog, and while containing about as much water as in its

natural state in the bog, is subjected to maceration until reduced to a pulp of watery fluidity whereupon it is pumped through a pipe-line."

149532—July 29, 1913.

Thomas Rigby, Dumfries, Scotland, and Nils Testrup, London, England.

Process for the Utilization of Peat.

(Assigned to Wet Carbonizing Limited)

The object of the invention is to provide a process and installation capable of application on a large scale for utilizing peat by gasification in bye-product recovery gas producers.

In order to overcome the disadvantages incident to air-drying of peat, it is proposed to first reduce the moisture by means of filter presses to about 70%, and afterwards to disintegrate the partially dried peat, and to suspend the disintegrated material in hot products of combustion, to complete the drying operation to the desired extent, then to briquette the dried peat and gasify it in a producer.

179991—July 29, 1913.

Joseph Berglund, Eskilstuna, Sweden.

Process and Apparatus for Treating Peat.

The raw peat mixed with large quantities of water in such manner that the small particles become suspended while roots and other coarser material are separated by means of a continuously moving strainer is conducted into basins on the ground and left to dry. The layer of peat cracks in drying and without further treatment is claimed to form a good fuel.

ANENT "HOT AIR."

We are in receipt of a number of The Percolator, the bulletin of The Chemists' Club of New York for August 20th, 1913. Among other interesting contents we note a learned contribution to the Study of Flatus Caloricus or Hot Air by Mr. Ellwood Hendrick. The thanks of all Peaters are due Mr. Hendrick for this very illuminating discourse, from which we take the liberty of quoting:

> "We know that hot air is a product of the human animal, and that its most frequent modification is to be found in the exhalations of the breath while speaking."

"Hot air is distinguishable by what it is not, as well as by what it is. Thus, Truth, which I am also disposed to believe is a gas, is seldom found in hot air, although facts are sometimes present; usually, if not always, in an uncorrelated condition. H_2S and other mephitic gases are often present, but when we consider in what large measure hot air supports life, we must beware lest we assume too great a CO_2 content. It supports life among lawyers in amazing measure, and it has been known to maintain chemists for considerable periods of time. Sir Oliver Lodge says of a gas that "it has neither volume nor shape," and this holds true of hot air."

"Hot air has a density, as every one must admit. Its transition points from a gaseous into a liquid form and again into a solid phase seem to be close together, for while few of us have observed liquid hot air, solid hot air is known to all. It is very frequently observed to cause a feeling of extreme weariness to those who, being surrounded by it, are forced to inhale it. It also, at times has a choking effect. Despite these mildly toxic qualities it cannot, as we have already observed, be regarded as a virulent poison, considering the measure in which it supports life. The ability to withstand it appears to be constitutional, some seeming to enjoy it, others being driven mad by it, whilst occasionally utter collapse follows its administration. Very frequently it appears to act as a catalyzer to anger bodies, which in turn gives rise to a desire to punch the head of whatever Emitter may be present. There seem to be no changes in the vapor density of hot air above the temperature of 1000°C. In fact, this temperature is recommended on occasions of hot air poisoning, and is invariably effective if the hot air exhaler or emitter is plunged into it."

"The question has arisen whether there may occur an emanation of hot air from the written or printed page. Without going into detail, we may say that indications point to it."

"Although no instrument of precision has been devised to measure it, its presence may be determined qualitatively by a physiological laboratory test. The following method is recommended:

"A human animal is placed in an upright posture in an ordinary chair or settee. No anesthetics may be given. All reading matter, newspapers and books are removed, and an active hot air emitter is brought into the laboratory and placed in close proximity to and facing the human animal. The emitter is encouraged by psychological means to talk intently. Evidences of fatigue and distress will shortly appear in the human animal and expressions of despair and cries for help on its part will indicate the certain presence of hot air."

Peaters will readily recognize the accuracy of Mr. Hendrick's determination of the phenomena attending emanations of hot air. One form of re-action which he has overlooked will be familiar to peaters, and we believe is not unknown to those engaged in other lines of industrial activity. We refer to the fact that after long continued and copious emanations of hot air there has frequently been observed a serious and sometimes alarming shrinkage in the bank accounts of those exposed to its mephitic influence.

The peat industry has in the past suffered severely from "hot air" of the variety under discussion. Whether it will ever be commercially practicable to supersede open air drying of peat fuel by any combination of pressure and artificial drying is a moot point. If it were possible to supplement the combustion of fuel by drawing on the copious supply of "hot air", the results might be surprising. The optimistic inventor and the more or less unscrupulous promoter we have always with us.

PRODUCER POWER PLANTS.

The United States Bureau of Mines has published a study of the producer-gas plants using anthracite. Such a plant has large conservation and commercial possibilities. Government experiments for eight years have demonstrated not only a very low fuel consumption per horsepower hour, but also the possibility of utilizing commercially low grades of bituminous, lignite and peat.

There are in present use engines with aggregate capacity of 200,000 horsepower deriving this power from producer gas. Engines with power from blast furnace and coke oven gas aggregate 350,000 horse-power. The latter type is largely in steel works, the power being used for mills and furnaces.

There are producer-gas plants in 46 States, the District of Columbia and Alaska. From 1909 to 1912 such plants increased from 474 to 722, or 52 per cent. Horse-power increased from 11,250 to 187,140, or 68 per cent. Plants using anthracite increased from 415 to 610 and their power from 48,100 to 89,470; those using bituminous from 37 to 77 and power from 54,150 to 86,605; those using lignite from 23 to 32 and power from 9,000 to 10,230.

The producer-gas power plant has proved economical in obtaining power and in using fuels such as peat and lignite. Texas in 1912 had 28 producer-gas power plants, of which three used bituminous coal, six used anthracite, and 19 used lignite.—The Canadian Engineer.

PEAT IN NORTHWESTERN QUEBEC.

In the vicinity of Laval and McGill lakes, peat has accumulated to great thickness; for considerable distances the shores are margined by banks of this material up to six feet high, and in places the clay basement upon which the peat rests is not exposed. Between these lakes and the great northern bay, near the western end of Matagami lake, the land is very low. Since locally peat also appears upon the shores at the bottom of this bay, it is highly probable that very large percentage of this low intervening area is occupied by heavy deposits of peat. Similar deposits of peat must be of frequent occurrence between Laval and McGill lakes and the western shores of Soskumika lake. They also occupy a considerable percentage of the flat area in the vicinity of Kelvin lake. Less extensive peat bogs were observed in places along the western shore of Matagami lake, and on Elizabeth bay of Olga lake.—Extract from a report on the Geology and Natural Resources of certain portion of the drainage basins of the Harricanan and Uttaway rivers, to the north of the National Transcontinental Railway line in Northwestern Quebec, by J. Austen Bancroft, April, 1913).

The Journal of the Canadian Peat Society may be found on file at the following libraries:—

Parliamentary Library, Ottawa, Canada.
Library of the Geological Survey, Ottawa, Canada.
Library of the Mines Branch, Department of Mines, Ottawa, Can.
Library of the Department of Labour, Ottawa, Canada.
Carnegie Library, Ottawa, Canada.
Legislative Library, Toronto, Ont.
Public Library, Toronto, Ont.
Library of the Society of Chemical Industry, (Canadian Section), Toronto Ont.
Public Reference Library, College and St. George Streets, Toronto, Ont.
McGill College Library, Montreal, Que.
Library of the Canadian Society of Civil Engineers, Montreal, Que.
Library of the Department of Agriculture, Regina, Sask.
Library of the American Institute of Mining Engineers, New York, N.Y.
Library of The Chemists' Club, New York, N.Y.
Public Library, New York, N.Y.
Scientific Library, U.S. Patent Office, Washington, D.C.
Library of the Department of Agriculture, Washington, D.C.
Smithsonian Institution, Washington, D.C.
Pennsylvania State Library, Harrisburg, Pa.
State Library of Massachusetts, Boston, Mass.

BACK NUMBERS.

Vol. 1 No. 1—Only in sets comprising the whole of Volume 1	$1.00
Vol. 1 No. 2—Each	.25
Vol. 1 Nos. 3 and 4 combined	.50
Vol. 2 No. 1—Each	.25
Vol. 2 No. 2—Each	.25

Vol. 2 DECEMBER, 1913 No. 4

JOURNAL

OF THE

CANADIAN PEAT SOCIETY

Published Quarterly by the Society
Subscription Price - $1 per annum
Single Number - Twenty-five cents

CANADIAN PEAT SOCIETY
Room 22, Castle Building Ottawa, Canada

TABLE OF CONTENTS

Journal of the Canadian Peat Society

Vol. 2 DECEMBER, 1913 No. 4

PEAT MOSS.

SOME OF ITS USES, ITS MANUFACTURE, ITS FUTURE ON THIS CONTINENT.

By W. F. Todd, St. Stephens, N.B., Canada.

The best peat moss bogs are made up almost wholly of sphagnum moss, the variety Fuseum. This species has the greatest absorptive power and longest life when used as litter. In Europe and perhaps on this Continent, most of the sphagnum bogs, whether dead or living, will make peat moss litter and mull from their upper layers, and peat fuel from the lower layers. The quality of this peat moss will be determined by the age of the bog, its degree of humification, and the variety of sphagnum which makes up the greater part of its substance.

I am informed that in Europe, it is very rare, if ever to find a bog that is purely a peat moss bog, i.e., suitable for moss litter from top to bottom. This may be the case in many parts of Canada and the United States. But the bog upon which I did most of my experimental work, is a raised sphagnum bog, and purely a moss-litter bog. Other bogs that I know of in this and the adjoining county are of the same character, and among the finest to be found anywhere. The best peat-moss bogs are near the seaboard, where the fog and dampness gives them their fullest and most luxuriant growth. Very little, if any bush growth is upon them, and because of the Eriophorum or cotton grass amid the sphagnum, the bogs have the appearance as you approach them of old run out grass fields. The description of bogs generally as to their composition, their kind, and their plant growth, has been written so well and thoroughly by others and so often read by all who are interested in peat matters, that it would be but a waste of time for me to refer more than I have done to these points. But in the future of the moss-litter business when competition shall have become keen, purchasers will be governed by the cleanliness and absorptive powers of the samples brought before them, and select that of the higher merit, if the moisture content is alike. Therefore it behooves one who intends to manufacture litter alone, to select a bog of the highest quality.

Among the many uses of peat-moss written of, I would choose as the two best and most important uses of Peat-moss: First, for sanitation; second, for litter purposes.

Peat-Moss for Sanitary Purposes.

It must be in a fairly fine powdered state to give the best results. In this state it takes up liquids and gases more quickly than if larger lumps or particles were used. It is a maxim of sanitation that a dry system of sewage removal is the best. Earth has been found unsatisfactory. Peat powder is a perfect medium in which to attain this proper sanitation. The wet or waterborne system of sewage removal, with its deadly danger from sewer gas, and its pollution of the water courses, through which it flows, will have to be endured in cities and towns, until saner regulations bring the hygiene of sanitation to a better and more perfect state. Peat-moss or peat powder will kill infectious germs and destroy bad odours, without leaving another in its place. To those living in towns, villages and the country districts, the use of peat-moss powder, through dry closet use, will prove a great boon in the way of comfort and health to the people, to say nothing of the great saving it will make to agriculture. Peat moss powder has a complete deodorising power, with disinfecting properties. It has the greatest power for absorbing liquids and fixing gases. It resists putrefication and fermentation until mixed with the soil bacteria. In the case of epidemics, capable of being spread by the germs present in the excreta, this powder will hold fast these germs, if not entirely destroy them, and if there should be doubt upon this point, a 3% solution of sulphuric acid mixed with the powder will kill all infectious germs contained. To whatever applied peat-moss powder stops putrefication, destroys odours, and keeps away flies, which now, our best authorities agree, cause the spread of many infectious diseases.

Peat-Moss as Litter.

In 1887-88 I placed upon my stock farm a large number of valuable trotting bred horses for breeding purposes. Upon some of the stock farms I visited, at that time, I noticed that imported peat-moss bedding was used. I was attracted by it, and began at once its use in my stables. I was more than pleased with its good qualities, and in my experience with it, I never found one single point against it. Indeed, so enthusiastic did I get from its use, that I set out at once to find deposits of a like material in my own neighborhood. This was the start of my enthusiasm in peat-moss and its manufacture, an enthusiasm and hope that has never waned, in spite of all the bitter reverses and setbacks I have had. In my use of peat-moss as bedding I have proven the following facts; that one ton of a good peat-moss will last as long as two and one-half tons of straw, and that in a box stall, (if bedded and seen to properly)

one bedding could easily be made to last three months. On my farm in one box stall, I used one bedding of peat-moss before removing thirteen months and six days. I was making a test of it. In all that time no disagreeable odour arose from it. In the handling of at least 150 horses and colts on bedding of peat-moss, I knew but one horse that would eat it, and this was one of my farm work horses, with a morbid appetite that craved mud, muck or anything of that nature. The eating of this bedding for weeks never had the least deleterious effect upon him. This material is highly conducive to a healthy growth of the hoof and I cured the worst case of thrush I ever saw on this bedding. A horse can be kept cleaner and healthier on this bedding, with a quarter less labour than when straw is used. No drainage of the stall is needed. No ammoniacal or other odour from it, but always a sweet smelling stable. No dust if bedding directions for its use are followed.

There are two great claims that I can truthfully make for the use of peat-moss bedding, and which I have never seen mentioned by others. One is the fact that flies will not harbour in it, or breed about it, and wherever it is used wholly in a stable, you will find very few if any house flies. This is a great boon, as the house fly is now looked upon as a great menace to health in its power to carry disease germs. This freedom from flies is brought about partly because the peat-moss in itself is repugnant to them, because of its powdery condition, and partly from the fact that there is no food whatever in it for them. But this freedom from flies in summer can only be attained by removing the droppings of the animals three or four times a day and burying them under a slight covering of the used peat-moss. Otherwise flies will lay their eggs in these droppings, which in a few hours will hatch out unless stopped by the peat-moss.

The other great claim I make for the use of peat-moss bedding is its perfect freedom from danger of fire. You may explode a lamp or lantern upon it and you cannot set it on fire. The kerosene will burn out, and leave nothing but a slightly charred place where the oil burned. I have tested this again and again. I have lighted armfuls of newspapers on the bedding, but could never get the bedding to burn. I would rather have one pailful of peat-moss bedding well fired, to smother flame, than two pails of water.

When you consider these safeguards in its use, and how clean and healthy an animal can be kept on a bedding of this material, you can judge that a large use of it will grow up in this country. By repeated thermometer tests in winter I have found peat moss bedding two to three degrees warmer than a straw bedding. The best agriculturists of the past, and those of the present time state that the condition most needed to ensure certain and good crops is sufficient moisture throughout the growing season. With a great lack of humus in our soils, how can we hold and conserve moisture after our rains. I hold that the use of peat-moss manure will best and most quickly give this result

when plowed into the ground. From the poorest to the very best peat-moss the range of absorption is from 8 to 28 times its own weight. The peat-moss particles become loaded with the water that percolates through the top sod during a rain storm. This moisture is given up to the crop roots very slowly and gradually, when the upper layer of the soil dries out by surface evaporation. Thus by its use, a drought will be robbed of its deadly power, heavy soil be lightened and made more permeable to air and water, while sandy and light soil will be made retentive of moisture. Peat-moss bedding, after use under animals, makes a splendid fertilizer to apply to all crops. It contains, to start with, twice to three times the nitrogen content of the best barnyard manure. It locks up perfectly all the liquids from the animals (which is two-thirds of the total manurial value of the excretions) and only gives it up when mixed with the soil and fermentation takes place.

Moss litter will be found the best and cheapest bedding for animals. Horses and cattle, when bedded upon it, can be cleaned with very much less labor, and the stalls cared for in one-fifth the time it takes when straw is used. It keeps the hoof in splendid condition, and is highly conducive to its quick and healthy growth. It is very cleansing to the skin, and a white or grey horse will never show a stain when bedded upon it. It will not take fire. It is a perfect deodorizer and disinfectant, killing cholera and other deadly disease germs immediately. Thus it proves one of the best safeguards against disease to those working about it. As a fertilizer it is unexcelled, and entirely free from disagreeable odours that usually arise from highly concentrated manures.

Directions for Using Moss Litter.

By observing implicitly the following directions for using moss litter as bedding, the best satisfaction and economy will be found and the greatest pleasure will ensue from its use:

Make the bed at least 6 inches deep.

Take the droppings out three or four times a day by laying a basket on edge and scraping same into basket with a shingle or other piece of light wood. This is easily and quickly done and adds very largely to the last or wear of the bedding. After the first two or three weeks use, when the bedding should get a little moist on top, take a three or four pronged fork every morning, after the droppings are removed and before the horse is returned to the stall, and plow the moss (by shoving the fork before one) bringing the bottom moss to the top, then with a short handled rake, smooth the bed down and it is done for the day. If there should be a very wet spot at any place in the bedding take this out and throw to the edge of stall, in case of a box stall. But in a narrow, standing stall the wet place had better be removed entirely and a shovelful of new moss put in its place. Follow this course every morning and the bedding will last week after week and form a fine, soft bed. Close all

sewers leading from stalls when moss litter is used, as it absorbs every particle of liquid, and any loss of liquid injures its fertilizing value. When used in narrow stall use a piece of plank or deal behind to keep moss in if so desired. Should moss, when first spread be a little dusty at any time, give it a light sprinkling for a few mornings with a watering can, and it will then wear for weeks without any further treatment in this particular. After using it can be put in any basement cellar without risk, as it never steams and will not rot the timbers or woodwork. It will last as a bedding from three to six months in a box stall, according to the season of the year.

In a standing stall, where the animal is tied, you do not need as thick a bedding, although it should not be less than four inches deep behind the animal. This, so that the liquid voided cannot go clear through to the floor, and be wasted for agricultural use, by passing into the wood of the floor. A standing stall requires a piece of scantling say 2 inches or 3 inches by 4 inches at end of stall on the floor to keep the bedding from spreading out on the stable floor. This can be made with beveled edges so as not to trip the animal when passing in and out, and be more comfortable if any part of the rump of the animal should reach it at any time when resting at night. Any user of litter can easily arrange this. No drains are needed, and if a strainer pipe is in the stall to take away the liquids put something in and over it to keep any of the bedding from passing down. The bedding absorbs every particle of the liquid and drainage is needless as you can well see. If any one is building or repairing stalls, by all means advise them to put in a cement floor and cement sides up 8 inches. This will make a permanent, lasting work.

I feel sure that the use of peat-moss on this continent will increase by leaps and bounds when its good qualities are preached to the people, and manufactories start up and meet the future demand. This continent with 110 or more millions of people are using but 8,000 tons of peat-moss, while Great Britain alone, year before last used 180,000 tons.

This should not be, and I prophesy that the next few years will see a great change in this respect and the products of our peat-moss bogs will be called for from one end of the land to the other.

CANADA'S PEAT INDUSTRY.

By J. G. Adams, B.A.

(From The Journal of Commerce).

Canada's peat industry has become an economic factor of commercial importance. It has passed beyond the experimental stage and is now on a basis for extensive development. As yet the enterprise is but in its infancy,

but with almost unlimited raw material in various parts of the Dominion and a method of manufacture and preparation which is successful financially and mechanically, it remains only to create a demand for the product by advertising its qualities as a fuel and showing that it is cheaper than anthracite, to create market conditions which will insure the interest of capital in its development and create an expansion which the importance of the problem justifies.

In these days when one and all are complaining of the high cost of living, when the industrial man excuses the high prices of his produce by the increase in prices of his raw material and of the accessory material for its manufacture, when the household is complaining of the apparently exorbitant prices of the home necessities, it is of importance to note the introduction of any material which will tend to relieve the pressure by reducing expenses. That peat is a less expensive fuel than anthracite or other varieties of coal and quite as suitable for industrial and domestic purposes, has been demonstrated by exhaustive experiment.

As a country Canada is dependent on the foreign supply for a high percentage of her fuel. Her wood supply is rapidly becoming exhausted and falls short of supplying even the demand for domestic fuel. With coal areas situated in the extreme eastern and western portions, which as yet, furnish only a limited supply of fuel, the central portions of the Dominion are almost entirely dependent for their fuel with which to promote industrial development or to supply home comforts on the republic to the South. During the year 1912 Canada's coal mines produced 14,699,953 tons, while during the same period 14,574,899 tons of anthracite, bituminous and dust coal were imported from the United States.

The above figures show the total amount of coal imported, or in other words we are entirely dependent on the United States for approximately 50 per cent. of our fuel supply. For this supply we paid $39,468,467, or Canadians gave almost $6.00 per capita during 1912 for this one imported article.

Under such circumstances it surely behooves us to inquire into the question of our natural resources to find if some remedy may not be found for conditions so undesirable industrially and economically.

The most promising means of relief lies in the development of our vast peat fields. It is estimated that some 40,000 acres of bog have been surveyed or explored in different parts of the Dominion and this is thought to be only a fraction of the total. The southern boundary of the peat area may be said to be a line drawn from the Atlantic Coast in New Jersey through northern Pennsylvania, Ohio, Indiana, and Illinois, Wisconsin, and Eastern Minnesota, which passes into Canada through Western Manitoba. Crossing to Alberta, it curves southward, passing through southern British Columbia and entering Washington, U.S.A. North of this line there is an almost incalculable amount of peat between the Atlantic and the Pacific, much of it still unknown. The

largest bogs known lie east of the Great Plains in Ontario and Quebec. It has been found as far north as the Churchill River and at the southern border of the Barren Grounds. Over this area the peat averages possibly 20 feet in depth, and when it is remembered that one acre of peat one foot deep will yield approximately 250 tons, or that an acre 20 feet deep will yield about 5,000 tons, one may understand, in some small degree, the importance and value of this almost unlimited supply of fuel.

It is quite generally known peat is of vegetable origin, and the bogs are really ponds or lakes which have been filled with decaying vegetable growth, which now varies in depth from one inch to sixty feet, and under natural conditions is now found covered with a mantle of moss and other smaller vegetable matter which may or may not be accompanied by a growth of shrubs or of tamarac and spruce trees. Under natural conditions the bogs usually have a certain amount of surface water which may be permanent or only periodical and this makes drainage a necessary prerequisite to the digging of the peat.

After this surface water is removed a large percentage still remains, part in mechanical suspension and part in chemical combination. It is estimated that as much as 80 to 90 per cent. of moisture is retained in the natural peat by these means and the method of manufacture which can most economically and most successfully remove 60 to 90% of this moisture is the one which receives most favor among those interested. The solution of this problem has developed many variations of three main methods of manufacture which are known as first, the dry process, by which the raw peat is collected either in its natural condition or after a partial air drying, the water reduced to a suitable percentage by artificial means and the product briquetted by pressure; second, the wet process, in which the peat as collected and before drying is thoroughly ground and puddled, moulded into bricks or any desirable form and then dried; and, third, methods in which the moulding or briquetting of the peat is omitted.

The value of the product and the ultimate necessity of developing the peat areas has led many individuals and companies to formulate methods and attempt the production of peat fuel on a commercial scale during the earlier history of the industry in Canada. Much money, thought and energy were expended and many plants erected in an endeavor to solve the problem. But owing to lack of experience and of sources of information as to methods, etc., most of the enterprises proved to be failures either commercially or mechanically, or perhaps in both respects. With a view to the preventing of any further futile expenditure on the part of private investigators the Dominion Department of Mines about 1907 appointed an engineer to investigate conditions and methods of manufacture in Europe where the industry had already been placed on a successful working basis. The report submitted showed, first, that for the economic production of fuel from peat, machinery driven by power must be substituted as far as possible for manual labor; second, that processes, so

far invented, for removing the water content of the peat by pressure and artificial heat have not led to commercial results, and after trial have been abandoned.

Dr. Haanel, speaking before the meeting of the American Peat Society in Ottawa in 1910, said:

"The endeavor to accomplish economically, by artificial means, and in a short time what has been accomplished by nature in exceedingly long periods of time, namely the change of peat into a substance similar to coal, has so far, apparently not been attended with success. I would not like to say that it cannot be done; since it is unsafe to many any statements regarding the possibility of future achievement; but at present the outlook in this direction is certainly not encouraging. In view of these facts, the only proper course for us in Canada to follow, if we desire to establish a peat industry and render ourselves, at least to some extent, independent of outside sources for our fuel. is to introduce such processes and such machinery as have proved successful and are now in actual commercial operation in Europe. It was with the view of introducing these methods in Canada and of showing that they were adaptable to Canadian conditions that the government purchased a bog of 300 acres at Alfred, Ont., and began the manufacture of peat by methods which had been found to operate successfully in Europe."

Without giving details of manufacture by the two methods, namely wet and dry processes, it will be sufficient to show some differences in the finished product, which show decided advantages in favor of the wet method, and which coupled with advantages in manufacture have served to bring about the adoption of this method in Canada. The following differences in the peat produced by the two methods are noted: First, the dry process fuel is not so dense as the wet, i.e., more fuel is contained in a given volume of wet process fuel than in the same volume of dry process.

Second, the dry process of pressure peat consists of unaltered particles of vegetable material. In the wet process the fuel is a homogeneous mass in which all traces of its vegetable origin have been destroyed.

Third, another difference which follows directly on the preceding is that dry process peat is hygroscopic and will disintegrate within a few hours or a few days if exposed even to a damp atmosphere and in water will soon return to its original form. The wet process fuel will not take up any appreciable amount of water. Pieces have been immersed in water for a year and although softened on the outside have remained intact. But in no case is it possible to reduce it to its original wet and plastic form.

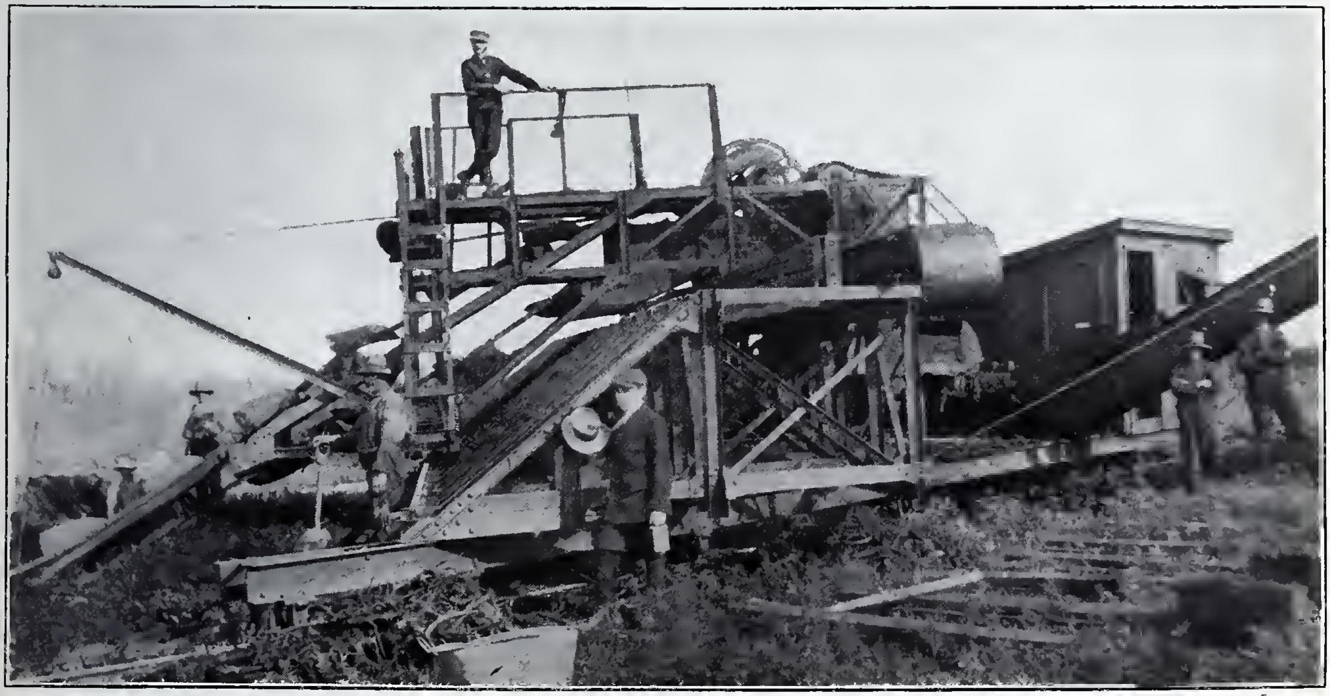
Fourth, the dry process peat burns very unsatisfactorily. Owing to the breaking down of the briquettes in an ordinary stove a great deal of glowing ash and fuel falls into the ash-pan, causing much waste. Special stoves or grates are necessary therefore to hold the ash until combustion ceases. The

wet process fuel in contrast burns in a most desirable way. The combustion beginning on the outside of the briquette works gradually towards the centre, but all the while the block retains its original form and when consumed undisturbed the block of ash is a "practical duplicate of the block of peat." Moreover when in the fire it will stand almost as much pressure as anthracite.

The destruction of the cells in the wet process explains the difference in hygroscopic qualities of the fuels. In the dry process fuel capillary attraction and the presence of innumerable vegetable cells explains the rapidity of the taking up of moisture. And in burning, this fuel consisting of an infinite number of cells from which the water has been pressed and which are now filled with air, is fractured by the heating of the air in the interior and the block falls apart as has been mentioned.

The process employed on the government bog at Alfred, Ont., is a variation of the wet process method and as has been stated has been installed after full investigation into the most successful European methods. The plant consists of five separate units namely, the Power House, the Excavator and Macerator combined, an overhead Cableway, the Spreader and the Harvesting equipment.

The power house is at a distance of about a quarter of a mile from the bog proper. The essential equipment consists of a large 80 or 90 horsepower tubular boiler which is fired entirely with peat; a 13x30 inch Corliss engine used to run an alternator and its exciter. These are connected with a switchboard and the



MECHANICAL EXCAVATOR AND MACERATING MACHINE EMPLOYED AT ALFRED, ONT.

usual measuring instruments. The 2200 volt current developed is carried to the working field of the bog and used to run the machinery in use there.

The excavator and macerator rests on a primary car supported by three sets of wheels on three parallel tracks. The rails of these tracks are in sections and the ties are so arranged that the whole machine may conveniently be moved forward as digging progresses. The car also supports a step-down transformer by which the 2200 volt current is brought down to 550 volts, from which it is distributed to drive the macerator, the excavator and cableway, and spreader. The rear of the car also supports a steel bridgework supporting two parallel rails, on which is mounted the traverser, which travels slowly backward and forward on the parallel rails. The excavating element is supported above by the traverser and below by an arm, the outer end of which can be raised or lowered to regulate the depth of excavation. When operating, the primary car remains stationary, while the traverser travels from one side to the other. The car is then moved ahead about eight inches and the traverser makes its return trip to the opposite side of the excavation. The peat from the excavator is dumped into a trough from which it is delivered into the macerator. From the macerator the peat is propelled by a 16-inch spiral conveyor to a loading hopper situated on the inside end tower of the cableway which conveys the peat to the spreader.

CABLEWAY FOR TRANSPORTING PULPED PEAT FROM MACERATOR TO SPREADER ON DRYING FIELD, ALFRED, ONT.

The cableway* consists essentially of two towers placed about 900 feet apart and so supported on wheels resting on rails held in place by ties of peculiar construction that they can move only in a direction at right angles to

*This cableway is not used on the plant of The Peat Industries Limited, at Farnham, Que., but the peat is conveyed from the Macerator to the Spreader in small dump cars running on a specially constructed track which may be moved sidewise as the peat is spread over the surface in order that the track may be in line with the Spreader.

a line drawn from one tower to the other. These towers support two parallel cables and on each tower connecting the ends of the cables are semi-circular tracks forming a continuous and endless single track. Between these end towers are light wooden supports every 75 feet mounted similarly to the end towers. Steel buckets travelling on these cables are operated by a system of drums and pulleys run by a 10 H.P. motor fixed on the inner tower. These buckets deliver the peat to the spreader.

The spreader is essentially a box having the peat dumped into one end and uniformly distributed throughout by special screw conveyor. It is discharged from the box again by thirty-four moulding spouts, each of which is fed by a separate conveyor. The whole arrangement is hauled by a small tractor at a rate of about 84 inches per minute. This spreads the peat on the ground in

MACHINE FOR SPREADING PULPED PEAT ON DRYING GROUND AND CUTTING PEAT INTO BLOCKS, ALFRED, ONT.

thirty-four rows, 4 inches wide, and 4 inches thick. An attachment is fixed to the rear of the spreader which cross-cuts these rows every eight or ten inches as desired.

The fuel is left on the ground in this condition in parallel rows about one foot and nine inches apart for a few days or a week, depending on the weather, after which it is piled by hand into little piles and when dried down to 25 per cent. water content is ready for shipment.

The finished fuel is in the form of bricks about 2x4x8 inches, a very convenient size for handling. Its merits as a domestic fuel when compared with

anthracite show it to be equally serviceable and more economical. Peat will average from 10,000 to 12,000 B.T.U. per pound while hard coal usually gives 14,000 to 16,000 B.T.U., but in practice the available heat units are much greater proportionately than in coal, because the waste in peat is only 4 to 5 per cent., while that in coal runs from 16 to 26 per cent. Furthermore, the cost of pro-

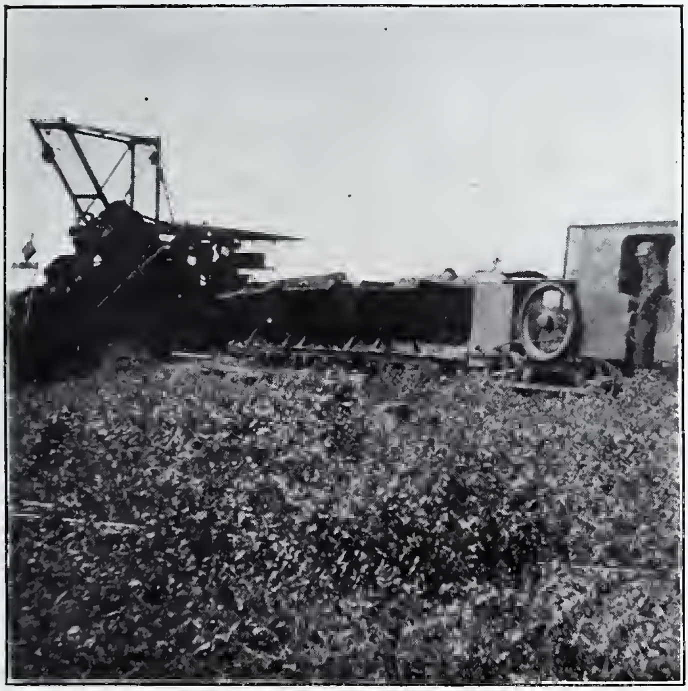
PEAT LAID OUT FOR DRYING AT ALFRED, ONT. PLANT

duction has been so minimized by the study of conditions and the elimination of all wasteful factors, such as unnecessary manual labor, etc., that peat can be sold at $4.00 to $5.00 per ton, and at the same time give a profit on the capital invested. These prices are from $1.00 to $2.00 below the average price for coal and consequently this fuel should prove attractive to the consumer for financial reasons.

It has been our aim in this short article to give some account of the desirability of peat for a domestic fuel only. That it has a far wider field of usefulness is proven by the investigations carried on by the Department of Mines at Ottawa to learn something of its utility for power production. These experiments have shown that it is an economical and efficient source of fuel for the production of producer-gas. Lack of space forbids the giving of details, but those desiring information are referred to the Report on the Utilization of Peat

Fuel for the Production of Power which may be obtained from the Department of Mines, Ottawa.

As can be readily seen, the amount of fuel produced each season by such a method as outlined above must depend in a large measure on the season and on weather conditions, since the manufacturers depend almost entirely on the sun's heat for suitable drying. The length of the period suitable for excavation during an average season is estimated at 100 to 112 days. This may seem to indicate a limited and fluctuating supply which could scarcely be depended on to supply any extensive market. But just as soon as market conditions warrant it an extension of the plants might easily more than supply any demand which might be created.



EXCAVATOR AND CARS USED IN CARRYING PEAT TO SPREADER AT FARNHAM, QUE.

The principal plants in operation at present are the Government plant at Alfred, Ont., and the plant of the Peat Industries Limited, at Farnham, Quebec. Other bogs near London, Hamilton and Brockville have been partially developed, but owing to the want of a successful method of preparation most of the work in these places has been stopped and the plants abandoned. Now that a successful means of production has been evolved an expansion should be seen in the development process and many of the other extensive peat deposits should be made to contribute to the maintenance of a supply of a cheaper and serviceable fuel for Canadians who should welcome it as a relief from the burdensome coal tax. Further development depends solely on commercial enter-

prise and the interesting of capital in the project. This should not be a difficult task since the value of the fuel is unquestioned, the raw material is almost

PEAT BEING "STORED" AWAITING SHIPMENT

unlimited, and the demand must grow as prices of coal increase and its value as a fuel becomes more widely known.

See editorial comments on the above article on page 21.

ELECTRIC POWER FROM FUEL AT MINES.

Excerpts from an Article by George E. Edwards in the Mining and Engineering World, November 15th, 1913.

The possibility of generating power directly at the mine mouth and not only using it locally but also transmitting electric current over long distances, is a subject to which considerable attention is now being given, and a number of plants for the purpose have been planned, particularly in districts where coal, iron ore, and metal mining operations are not far removed from one another.

Thus far the most conspicuous success in carrying out this idea has been attained by the Maritime Coal, Railway & Power Co., Ltd., whose headquarters are at Amherst, Nova Scotia. This concern has constructed at its Chignecto mines, 9 miles distant, a steam plant for the generation of electric power and its transmission to users at a distance, in the same manner that hydro-electric energy is disposed of.

The plant has now been in service for over 6 years and its operation has

demonstrated the practicability of converting the thermal energy of slack or refuse screenings into electricity for sale in distant markets. The demand for its output has constantly increased; and today the installation is the source of electrical supply for the municipalities of Amherst, Maccan, Nappan, River Herbert, Joggins and Chignecto, operating motors and a lighting system in each of these communities. Factory machinery, a gypsum quarry, pumps, blowers, hoists, fans and other equipment are included in the motor load, and by the use of an otherwise unmarketable fuel, which constitutes about .30% of the mine output, the plant is enabled to deliver electricity at economical prices throughout the district.

At the time that the Company began to mine the Chignecto seam it was found that the top seam was divided from the bench by a soft ply from 6 to 8 inches thick. In the mining process it came out in the form of culm and was extremely dirty. During the screening this material became mixed with the slack, lowering the quality of the latter to such an extent that the slack was of very little market value on account of the large amount of ash present. It cost the Company about 10 cents per ton to dispose of the material, so that the saving in converting the fuel energy of this cheap grade of coal into electricity is much greater than if a good quality were used, as the rate per ton for conveyance to the boiler room is the same in both cases. The fuel used at the plant could not be sold on account of its quality, and the space for banking was limited to an area close to the mine.

The power plant is a 75 by 100 feet brick and steel structure, with concrete foundations, and is located within about 100 feet of the colliery bank-head, fuel being delivered to the station from screens at the bankhead by a Jeffrey motor-driven conveyor. Robb, horizontal return tubular boilers of 1550 h.p. are in service, four batteries being installed. Two sets of blower engines and fans are provided, either being capable of giving 5 ins. of draft in the ash pit with all boilers in operation. Natural draft is also supplied by a steel stack 60 ins. in diameter and 40 ft. high. The fuel burned averages 20% ash, and when using the culm and refuse the fires have to be cleaned every 2 hours. The grate areas of the boilers were designed for 49 sq, ft. each, somewhat above the usual practice on account of the poor quality of the fuel.

Three-phase generators aggregating 125 kw. are at present in service, being direct-driven from 17 and 33 by 16 in. Robb Armstrong vertical, center-crank, cross compound engines, operating at 300 rpm., on a 26 in. vacuum, the units having direct-connected exciters. These engines are among the largest vertical type machines ever built in Canada, and are designed for automatic governing within 3% maximum on momentary changes of load.

The generators are of the General Electric type, one being wound for 220 volts and the others for 11,000 volts. Sixty-cycle current is delivered from each unit to a main switchboard.

The local load at Chignecto is handled by a 2200 volt service. From the power house two 11,000 volt overhead lines are run separately to the principal centers of distribution at Joggins and Amherst, each line being No. 4 B. & S. copper, carried on 15,000 volt porcelain insulators, supported on 30 foot wooden poles, spaced 125 feet apart. The pole lines are each designed for a second circuit.

The Joggins line is about 15 miles long and supplies the Joggins, Maccan and River Herbert district. All the machinery at the Joggins Mines is now electrically operated, distribution being at 220 volts alternating current. The largest motor on this line drives a ventilating fan for mining service. The Amherst line supplies energy for all the lighting and motor service in the town, and from this transmission circuit a tap is taken off at Nappan for the Maritime Gypsum Co., a modern sub-station for voltage conversion and local distribution being situated at the south of the quarry.

On the upper floor are placed self-cooling transformers reducing the potential to 2400 volts for local use, fuses, switches and low-equivalent lightning arresters. The lower floor contains 2400 volt oil circuit breakers, controlling the local feeders.

The operation of the Chignecto plant requires a force of 10 men. Two shifts are run, these being 13 and 11 hours in length. With alternate, the fire room requires two firemen, one ash wheeler and one man to blow out tubes and clean the boiler combustion chambers. At night two firemen and an ash wheeler handle the service. In the engine room the chief enginer and an assistant engineer handle the day load, the night shift being carried by one assistant engineer. The labor requirements are somewhat increased by the care needed to burn successfully the poor fuel offered, without decrease in steam pressure. The installation is at present producing energy upon a fuel consumption of about 6 to 6.5 lbs. per kw. hour. About 60 tons of refuse slack is burned per day.

(The utilization of peat fuel in gas producers, with or without recovery of by-products, to generate electric energy for distribution to near-by districts, is undoubtedly one of the most promising fields for the development of our peat resources. At Pontedera in Italy, at Oldenberg in Germany, and other points in Europe installations of this kind are in successful operation.

There are many bogs in this country situated where coal supplies are costly, and hydro-electric power is not readily available, which might be utilized to great advantage to supply electric power within a convenient radius, and thus supply with cheap power communities which must otherwise remain for a long time or altogether without its benefits. This is a phase of development of the peat industry which is well worthy of careful study and investigation.—Ed.)

THE "MOORE" PATENT WATER-JACKETED GAS PRODUCER WITH BY-PRODUCT RECOVERY.

Translation of Excerpt from Article prepared by Dip. Ing. Gwosdz, Charlottenburg, and published in German Technical Journal, "Gluckauf," of 21st June, 1913.

The Dowson & Mason Gas Plant Co., of Manchester, have been thoroughly testing for some years back a type of Gas Producer for the recovery of by-products, designed by Moore, and according to reports we have received, have obtained with it results which show very remarkable advances as compared with the usual Mond gas plants. The method which has been designed to effect this is surprisingly simple. It consists in the middle and upper zones of the Gas Producer being strongly cooled from without.

The main idea of the Moore process consists in preventing the decomposition of the ammonia formed in the Producer without the introduction of excessive quantities of steam. For this purpose the ammonia formed is protected against decomposition only by the outer cooling of the Producer above the combustion zone, whilst the steam required for the formation of the ammonia is introduced under the combustion zone only in such quantity as is necessary for the formation of the ammonia. We therefore distinguish three zones in the Moore Producer, which stand in a definite relation to each other. The first and uppermost zone is cooled on the outside by air and has a temperature which is lower than that in the usual producers (in the mean about 180° C.). The second zone, which is cooled by the water jacket, has a mean temperature of 300 to 450° C., whilst in the third and lowest zone a temperature of 800 to 1,000° C. prevails. As soon as the temperature of 450 to 500° C. is reached, any further protection of the ammonia by steam is saved. This explains why the steam can be kept so very much less in the new process as compared with the Mond process.

On account of the smaller quantity of steam introduced into the gas producing zone, a relatively higher temperature prevails, the gas possesses also a higher CO content.

The gas carries with it very much smaller quantities of steam than the ordinary Mond gas, it is much easier cooled; the auxiliary plant is also much simpler. The cooling of the gas is effected in a series of tubular coolers, with which the outer air comes in contact, after which it is freed from the tar in a tar separator, of the Pelouze-Andouin type. The ammonia is not separated by means of sulphuric acid, but in two scrubbers, placed one behind the other, as ammonia liquor. The ammonia liquor can be worked up into various salts, which are of a white colour, in contrast with the mostly tar-coloured ammonia

sulphate of the Mond plants. With the old process the same method of working would not pay, as owing to the large quantities of steam to be thrown down with the ammonia large quantities of cooling water would be necessary, which in conjunction with the water to be separated would cause a strong dilution of the ammonia liquor.

According to information received from the makers, it is possible, by reason of the conditions mentioned above, to operate a gas producer plant of the Moore design with a capacity of about 300 H.P. and upwards with profitable results on the recovery of the by-products. When we consider that with Mond plants this is possible only with a capacity of 4,000 H.P., we are justified in regarding the new type of gas producer very hopefully. The German industry, which hitherto has shown little inclination to take up the Mond system of gas production, will doubtlessly follow with great interest the further development of the Moore improved process.

Journal of the Canadian Peat Society

Published Quarterly by

THE CANADIAN PEAT SOCIETY

22 Castle Building, Ottawa, Can.

Subscription Price (4 numbers).. **$1.00**

Advertising rates will be furnished on application.

Remittances may be made by cheque (payable at par in Ottawa), draft, money order, or postal note to the Secretary-Treasurer of The Canadian Peat Society, 22 Castle Building, Ottawa, Can.

The article by J. G. Adams, B.A. on "Canada's Peat Industry" in the foregoing pages contains a few statements which require to be corrected.

Thus the area covered by peat is stated to be 40,000 acres which have been surveyed, having an average depth of 20 feet. The total area covered with peat which is known to exist, scattered over various portions of the Dominion, is somewhere near 36,000 square miles, of which the average depth may be more conservatively stated at 6 feet rather than 20 feet.

In comparing the wet and dry processes for manufacture of peat fuel, the statement is made that fuel made by the wet process is more dense than that resulting when the dry process is employed, and that the volume of a ton of wet process peat fuel is less than that of a ton of the dry process fuel. This is incorrect. The peat manufactured according to the dry process, as described in

the article, is briquetted, and is consequently more dense and therefore occupies less space per ton of fuel than the wet process peat.

The calorific power or heating value of peat fuel is overstated as being 10,000 to 12,000 B.T.U. per lb. At least this is true as far as Canada is concerned. The highest heating value per lb. of dry peat so far obtained with Canadian peat is 9,500 B.T.U. per lb.

Owing, however, to the high percentage of ash contained in anthracite coal now supplied for domestic fuel, a considerable quantity of the heat of the fuel is not utilized for useful purposes, but goes in part to maintain the temperature of the ash and clinkers at the temperature of the combustion zone. Moreover, the ash and clinkers prevent the complete combustion of the carbon in the fuel, part of which passes into the ash unconsumed. For the above reasons, peat with its low and non-clinkering ash content—at ordinary stove temperatures—can be more efficiently utilized for many household purposes, and burns in an ordinary cooking range or fire place down to a fine powdery ash containing no carbon whatever.

In conclusion it may be stated in order to remove erroneous impressions, that the plant at the Alfred peat bog has not been operated by the Department of Mines during the last two years. The bog and the improved plant installed thereon, which is described in the article in question, are owned by private parties who expect to produce peat fuel in commercial quantities during the coming summer.

No industry perhaps has suffered more from the roseate and extravagant prospects held out by stock-selling promoters to the more ignorant and readily gullible section of the public, than has the peat industry. Only when it is generally realized that the industry offers modest returns for investment under the most favorable circumstances, and that even these returns are not dissociated from a certain amount of risk, can we hope for the establishment of a sound industry which will be of economic advantage to the country, as well as affording a fair return to investors. It is in the public interest therefore, as well as that of peat men, that any statements published in connection with the industry should be able to stand the severest scrutiny.

We have recently received a prospectus issued by a Company which claims to own a "demonstrative plant," now in full working order in Montreal.

The prospectus, which is unsigned, states that "with our Gas Process," the peat bogs of Canada and United States "are real Gold Mines at the surface of the earth." No gold mines yet discovered would be a circumstance to the value of the peat bogs, if the statements made were fully capable of verification. But judging from the inducements held forth to purchasers of stock in the Company, the peat bogs are not the only gold mines intended to be worked.

The Company has an authorized capital of $1,000,000 and is said to be duly authorized "to carry on a business of producers and distributors of a gas obtained out of peat under a patent process and to sell the prepared peat for making gas." On the first page of the prospectus, it is stated that "the Company has secured full rights to this invention for the total sum of $480,000," while on the last page one learns that "as an evidence of their faith in the undertaking, the vendors are taking shares to the full amount of their sale price." So far as the prospectus shows the only real money in the concern, excepting perhaps whatever the charter and the "demonstrative plant" may have cost, is apparently, therefore, to be supplied by the public who are invited to subscribe in the following terms:—

> "What we think is a bonanza to the investors, we are offering today the common stock of our Company, which will have a big raise of say over a 100% shortly, at the par value of $10.00 per share nett. This is your chance, as our offer is limited to only the first $150,000, part of which is already subscribed. Get in quick to this great offer."

If $480,000 of the Capital Stock has been paid for the patent rights, and the public are to be allowed the privilege of absorbing $150,000 more at par, it would be interesting to know the disposal of the remaining $370,000 of stock, but the prospectus affords no information on this point.

Nor does it give any names of directors to the Company with the exception of "The Ingegnere Antonio Conti of Milano, Italy, who is a director of the Company, and a consulting engineer on the Gas Industries for the English, Italian, German and French Governments, and the author of a few internationally well known books on the Gas Industries, and an expert on the peat industries at large." Neither is any information given as to the proposed disposal of $150,000 to be raised by sale of stock to the public.

The cost of a plant of 120 tons daily capacity is stated to be only $13,400 as follows:—

"Structure	$3,00000
Machinery	2,000.00
Gas Engine (120 H.P.)	2,500.00
Elevators	1,000.00
Pulleys and Belting	900.00
Shafting	500.00
Excavating Apparels	3,500.00
Total	$13,400.00"

while "A peat Gas Factory costs about one-tenth of the ordinary Coal Gas Works."

"By the Company's process," it is said, "peat is turned into commercial and public in the form of Gas, *without the need of extracting the moisture.*" "Therein lies the real advantage of the process," etc., and a couple of pages further on,—"We again emphasize that peat is transformed into gas matter without the necessity of pressing and drying it."

As peat in its natural state contains 88 to 90 per cent. water, and this is not reduced by draining below say 85%, this means, if it means anything, that "A gas

of superior quality to any gas manufactured'' is to be made principally from water.

Another astounding claim is, ''Again and in accordance with our prospectus, *this process of ours being the only one known to extract Gas out of peat,''* &c.

The production of gas from peat is an established industry in Europe. At Oldenberg, Germany, Pontedera, Italy, and elsewhere, there are large electric power plants operating on peat gas generated by Mond and other producers.

All these plants use partially dried peat for production of gas suitable for power production, but the Company claim to take the raw peat from the bog at a cost of 19 cents per ton and by adding $1.60 worth of chemicals to peat containing say 85% moisture (1700 lbs. of water to 300 lbs. of dry peat), to produce a ''prepared peat'' which will yield a superior illuminating gas.

As above mentioned the prospectus states the cost of a plant of 120 tons daily capacity at $13,400. According to the figures given a single plant would yield a daily profit of $240.00 or $87,600 for a year of 365 days, a mere trifle of 650% per annum. But the minds of the promoters are not cast in a small mould, and such profits do not appeal to them.

Here are their estimated profits:—

"Profits calculated to a minimum, for a daily output of 1,000 tons:—

Yearly output	365,000 tons.
365,000 tons sold to factory at $4.00 per ton	$1,460,000.00
Cost—365,000 tons at $2.00 per ton	730,000.00
Yearly profit on 365,000 tons prepared peat	$ 730,000.00

"A quantity of 1,000 tons is only a minimum, as a part of this is already under contract, and the Company hopes within the next six or twelve months, to have a sale of about 5,000 to 10,000 tons per day, and this will give an idea of the benefits which our Shareholders will derive."

On what the Company bases its hope of a daily sale of 5,000 to 10,000 tons within the next six or twelve months would be hard to say seeing that they have only at present a ''demonstrative'' plant, and our climate makes it impossible to get on a peat bog to work during the winter months.

But this is not all. They are going to deal in valuable franchises.

"There are about 15,000 incorporated cities, towns and villages in Canada and to all the Peat Gas will appeal. If we only get 2% of these municipalities, we shall have three hundred franchises to write down to the tyde of our activities, and this represents the smallest approximate figure. Each franchise is worth about from $25,000.00 to $100,000.00 and it has to be noted that each contract would cover a period of from 25 to 30 years, and this will represent a clear profit of $1,000,000.00 from franchises alone, taken at a minimum."

Combining these figures, we have an annual profit of $730,000 on 365,000 tons of prepared peat sold to the factory, and a profit of $1,000,000 on franchises alone. On the sale of 5,000 to 10,000 tons per day which ''the Company hopes to have within the next six or twelve months,'' there ought to be according to their calculations an additional profit of $2.00 per ton on 4,000 to 9,000 tons daily for 365 days, or a further annual profit of $2,920,000 to $3,285,000, giving a total

annual profit of $3,650,000 to $4,000,000, with a bonus of $1,000,000 to be derived from sale of franchises, and all on an initial investment of $150,000.

For fear these figures might be looked upon as a little extravagant, the promoters cite how money invested in oil has given enormous profits, *e.g.* $100 invested in the Home Oil Company has since attained a value of $40,000, in addition to the dividends.

One might wonder where the market was to be found for the 5,000 to 10,000 tons of prepared peat to be turned out daily but the promoters are prepared on that point. The prospectus says, "Negotiations are pending for the sale and export of peat treated by our process. This company can export peat already treated to extract gas at $4.00 per ton, making the handsome profit of $2.00 per ton nett."

As to the foreign markets the prospectus says:—"Natural peat is now sold in Europe at about 2 shillings per cwt. (50 cents. per 110 lbs.), which means at an average of $8.00 per ton."

An official report published by the Mines Branch of the Department of Public Works of France giving yearly statistics of the mineral production of France for 1911, shows that the total production of peat in France during that calendar year was 58,521 tons, and that the average price of same was 12 fr. 57 c. ($2.45).

Official figures from other European countries would afford an equally striking commentary on the statement of the prospectus that peat is sold in Europe at an average of $8.00 per ton.

When the peat industry is only moderately remunerative in European countries where labor can be secured at 60 to 75 cents per day and often less, the idea of producing it in Canada for export to Europe has at least the merit of originality.

But let us quote the prospectus further:—

> "According to Government Reports, England draws from Holland natural peat at a rate of 50,000 tons every year, without counting another 400,000 tons yearly drawn from other sources, and the home production. We had dates on file to show that we can export at an enormous advantage Prepared Peat to almost any country."

A recent report by the Commercial Department of the Netherlands Ministry of Agriculture, Industry and Commerce, expressly states that all the peat produced in Holland is sold in the country itself. What is exported from Holland to England is peat moss litter for bedding horses and cattle and other purposes. Unless the proposal is to inflate bags with gas and bed the horses on these, it is hard to see how this market will be of service to the promoters of the present industry.

The prospectus in question would not deserve so much attention as it has been here given, if it were not for the fact that reckless mis-statements tend to discredit the legitimate peat industry in the mind of the public.

Four years ago, the Mines Branch investigated and reported on a somewhat similar process known as the Harris Peat Gas Process, the plant being situated in Newark, N.J. Their findings were published in the Summary Report of the Mines Branch for 1909. Among the numerous claims made by the inventor were:

(1) That peat containing upwards of 75 per cent. of moisture, rendering it unfit for other purposes on account of the large amount of heat necessary to evaporate the moisture can be utilized by this process, yielding a superior gas for light, heat and power.

(2) That one ton of peat containing upwards of 75 per cent. moisture when treated according to this process, will produce 12,000 to 14,000 cubic feet of gas, and will have a candle power nearly double, and a calorific value of one-third to one-half more than that of city gas.

(3) That by means of this process a charge of waste material such as peat can be retorted in less than half the time required to retort a similar quantity of coal, thereby saving enormously in time, fuel and labour, as well as tremendously increasing the output.

The process consisted in treating raw peat with a mixture of chemicals. Careful tests and analyses were made by an engineer and chemist sent to Newark by the Mines Branch.

The result of the investigation was to shew that the peat used contained petroleum before treatment. that a ton of the treated material would yield 8,650 cub. ft. of gas of a calorific value of 640 B.T.U.

80 lbs. of 75% moisture peat retorted shewed the following results:—

Water contained	60 lbs.
Dry peat substance	20 lbs.
Oil added with chemicals	4.32 lbs.
Oil found in peat	2.60 lbs.
Total oil in peat	6.92 lbs.

The oil added to the peat was shewn to supply 59.4% of the heat units of the gas produced.

The heat value of the gas supplied by the peat alone was insufficient to evaporate the water and maintain the temperature of the retort necessary for gasifying dry peat. 94 lbs. of coke were consumed in retorting 80 lbs. of peat.

The time consumed in retorting 80 lbs. of peat was practically the same as would suffice to retort 400 lbs. of coal. The residue, corresponding with coke produced from the retorting of coal, was in a finely divided state, and of no commercial value.

The conclusions arrived at were, in brief, that the operations, mechanical and thermic, did not show the process to be economical or the products of commercial value, in fact, that none of the claims investigated were substantiated.

NEW MANURE FROM PEAT.

By Mr. J. M. Mussen, Leeds, Eng., Sept. 27th, 1913.

A cheap method of obtaining organic artificial manure was described by Prof. W. A. Bottomley at a meeting of the Agricultural Section of the British Association.

It was asserted that by the treatment of ordinary moss litter with bacteria, an organic manure is formed, a ton of which it was claimed is worth more than 80 tons of ordinary farm manure. It has been found that the insoluble humic acid present in large quantities in peat can be readily converted into soluble humate by the action of certain aerobic soil bacteria.

Peat, after treatment with these organisms, is sterilized, and then inoculated with a culture of nitrogen-fixing organisms. This prepared peat can then be used for soil inoculation, either by direct application to the soil, or preparing from it a culture solution.

Experiments made at Kew upon plants demonstrate the remarkable effect which this peat has on plant growth, and at Chelsea Physic Gardens a plot of radishes watered once with an extract of prepared peat, gave an increase of 54 per cent. over another untreated plot. At Eton school gardens, the new preparation has been tried in competition with farmyard manure, and it gave the following increases: Lettuce, 27 per cent.; turnips, 23 per cent.; and potatoes, 41 per cent.

Ordinary organic manure is getting scarcer owing to the substitution of horses by motor-drawn vehicles and peat, it is stated, may become a marketable substitute.—Weekly Report, Department of Trade and Commerce, Oct. 13th, 1913, page 1207.

(The comparison made with ordinary stable manure, while apparently very favorable to the treated peat-moss litter, would appear to call for further confirmation before it can be fully accepted. Without having available the full text of Prof. Bottomley's paper any comment must be mere guess-work. We therefore print the item as it appears in the Weekly Report of the Department of Trade and Commerce in the hope that it will put some of our members upon enquiry and investigation of the statement which is of great importance if capable of full verification.—Ed.)

PEAT AS A FERTILIZER.

In a recent issue of the Farmer's Advocate, published in London, Ont., the following question and answer appeared.

"Q. I have rented an orchard of two hundred and fifty trees, all sizes, some just starting to bear and some very old ones. The soil is light and gra-

velly. The orchard has been neglected and is in bad shape. There is a peat bog adjoining, and the peat could be easily applied. Would it be of any value as a fertilizer?''—A.L.M.

Ans.—''As yet, in this country, peat has not been used to any appreciable extent as a fertilizer, owing to the fact that a large quantity would have to be handled in order to obtain a small quantity of fertilizing ingredients. Whether the peat near your orchard could be profitably applied as fertilizer or not, depends largely upon the character of the peat. The one outstanding ingredient of peat would be the nitrogen content. If this is high enough to warrant your applying it, then you could probably do so, because the organic matter in the peat would enhance the mechanical conditions of the soil. Send a sample to the Chemical Department, Agricultural College, Guelph, and have it analyzed for its fertilizing ingredients. Recently a method of treating peat and moss has been discovered in England by which one ton of the treated peat equals over eighty tons of barnyard manure. If this method could be established in Canada, your peat bog might be very useful.''

Ed.—It is to be hoped that A.L.M. will not only have his peat analyzed but will make a practical test of peat as a fertilizer by applying it to a portion of his orchard, leaving some of the trees without as a check. Where peat is located as in this case near light soil such as described, there should be little doubt as to its being an economic fertilizer. The process for treatment of peat referred to by The Farmer's Advocate is elsewhere dealt with in this issue.

THE WORLD'S SULPHATE OF AMMONIA PRODUCTION.

According to an authentic report, the world's production of sulphate of ammonia in 1912 was 1,331,000 tons, against 1,191,000 tons in 1911. This was made up as follows:—Germany, 492,000 tons, against 418,000 tons in 1911; England, 379,000, against 378,500; United States, 151,000, against 115,000; France, 69,000, against 60,000; Belgium, 50,000, against 40,000; Italy, 15,000; and Austria, Russia, Spain, Denmark and Holland, 175,000 against 169,500.—Weekly Reports, Department of Trade and Commerce.

SULPHATE OF AMMONIA.

USE AS A FERTILIZER IN ENGLAND.

Within the last few years rapid strides have been made in England in connection with the production of Sulphate of Ammonia, due to the large increase in the number of by-product coke ovens. A speaker at a recent dinner at Worsbro' pointed out that artificial fertilizers were not used in England to

anything like the same extent they were used in foreign countries, citing Germany, where the annual production of Sulphate of Ammonia was 440,000 tons, of which over 90 per cent was for domestic consumption. The production in the United Kingdom was 400,000 tons, and only 20 per cent. of this was used in England, the balance being exported.

Reference was made to the Sulphate of Ammonia Committee which has been formed to carry on propaganda work, and to extend the use, and make known the utility of sulphate. The producers of Sulphate were at present subscribing to the Sulphate Committee 9d. per ton on their output for this work. Experiments of the Committee during the last three years proved that 15s. per acre spent on Sulphate meant a return of 30s. when applied to cereals. As there were some six millions worth of Sulphate being made in the country, this meant that if all that was made was used in the country, the crops would be worth another six million pounds.—Colliery Guardian.

BRITISH IMPORTS OF MOSS LITTER, 1898-1912.

	Quantities Tons	Declared Values £
1898	80,449	94,681
1899	67,155	78,548
1900	76,925	90,690
1901	83,038	102,259
1902	96,075	123,075
1903	88,470	111,889
1904	93,183	115,953
1905	89,755	109,431
1906	88,072	106,999
1907	80,703	98,849
1908	76,470	93,498
1909	76,801	93,691
1910	76,064	91,341
1911	78,906	93,267
1912	101,864	122,727
Total for 15 years	1,253,930	1,526,898

Average price per ton £1.217—$5.90.

Statistical Abstract for the United Kingdom, 1898-1912, pp. 140-141, 156-157.

PEAT POWDER FOR LOCOMOTIVES.

In the August issue of the Journal there appeared an extract from a recent Report by C. E. Sontum, Canadian Commercial Agent at Christiania, Norway, having reference to the Ekelund process of manufacture of peat powder. One or two points in same are worthy of comment. The statement that "Several of the railways in Sweden have entirely gone over to using powdered peat for their engines," is rather broader than is warranted. Through independent enquiry we learn from a reliable source that the use of peat powder on locomotives in Sweden has thus far been experimental, and that none of the railways has thus far adopted it as a general fuel. Obviously this must be the case owing to the small supply as yet available. From the fact that the production of the only plant mentioned in the report is 15,000 tons per annum, it may be seen that the use of peat powder as a fuel on Swedish railways cannot as yet be very extensive.

There can be little doubt, however, that powdered peat fuel is likely to be of considerable importance for railway use. Powdered coal is extensively used in burning cement with excellent results. And it has latterly been successfully used on locomotives in the United States. An article on Pulverized Coal for Locomotives, by Walter D. Wood in a recent number of the Railway Age Gazette, makes some interesting statements in this connection, and points out causes of earlier failures in its use. These were mainly, trying to pulverize the coal on the engine itself, blowing the coal dust into the fire box with too great velocity, and troubles with slag.

It is pointed out that in order to use coal dust successfully on locomotives they must be equipped with special firebox construction, giving an ample surface of fire brick to blow the powder against. A special form of nozzle is also required, and such arrangement for air supply as will reduce the velocity of the entering dust to a minimum, permitting it to expand and burn before it is carried into the tubes.

The advantages of pulverized coal are thus stated:—

"There is a direct saving of one-third of the coal through more perfect combustion, a saving by the abolition of ash-pits and cleaning gangs, a direct saving in the ability to cut off the fire at will while standing in stations and on sidings, a saving in property values and paint on rolling stock through absence of smoke and cinders, etc. Added to all this is the wonderful flexibility of the fire, the supply of coal and air being increased or decreased at will by the turn of a valve. In switchers and other small engines a fireman would be superfluous. One of our largest locomotive companies at the present time is spending some $50,000 to adapt powdered fuel to locomotives."

One important cause of failure cited in connection with the use of coal dust would not be operative where peat powder is substituted, viz., troubles with slag. In the other respects mentioned peat powder should compare very favorably with coal dust.

THE RELATIVE VALUE OF PEAT LITTER.

In a verbal communication to the Editor of the Journal of the American Peat Society, a stable keeper in Michigan who for some years had used peat litter for his horses to the exclusion of all other kinds, said he considered peat litter well worth $15 per ton, the price he was then paying for it, when he could buy wheat straw at $8 in the local market. The peat litter lasted more than twice as long and his horses' feet were in far better condition than when he had used straw. Aside from these facts he said that all objectionable odors were entirely eliminated from his stable even in the hottest summer weather.

PEAT IN NEWFOUNDLAND.

The St. John, Newfoundland, News of November 21st, contains a report of Port de Grave Agricultural Exhibition, the first of its kind ever held in the district. The report states that the exhibition was from all standpoints a complete success, far exceeding the anticipation of the Committee that had it in charge. Among the products shown were several exhibits of peat, but no particulars are given as to the class of peat or method of production. In all probability they were hand-made by the methods which have been in use by the fishermen and farmers of Newfoundland for years past.

PATENTS RELATING TO PEAT ISSUED BY THE CANADIAN PATENT OFFICE.

148809—June 24, 1913. Peat Expresser.

Oscar J. Sigler, Mansfield, Ohio, and Henry J. Jarvis, Toledo, Ohio.
Assigned to the Union Peat Company.

This patent covers a press for extracting a portion of the moisture from peat. The essential features of the machine are an upper and lower endless platform, each consisting of transverse strips of wood, those of the lower platform being perforated. The platforms move on rollers revolvably mounted on L-shaped brackets and rigidly connected to the strips, and are covered by endless canvas belts to prevent clogging. The platforms are brought closer together at one end so that the peat fed in at the wider end receives gradually increasing pressure as it approaches the outlet, the liquid being forced through the perforated lower platform.

149597—Emil Hirsch, Engineer, 7 Heilbronner Strasse, Berlin-Wilmersdorf, Germany, July 29th, 1913.

Method of Dessicating Peat and the Like.

The invention relates to a method of dessieating peat and the like by the simultaneous or alternate application of pressure and a vaeuum, while the pressure and the evacuation or either of these processes ean be intermittently interrupted. The simultaneous pressure and evacuation, or each process by itself goes down during the interruption praetically to nought. It is stated that any cells eontaining moisture whieh during the first eompression may not have been entirely opened, will on the pressure dropping to nought again assume their normal position and at the following pressure another part of them will be opened and expressed. The result of this method of treatment is expected to be more perfect, the oftener the pressure is interrupted during the period of treatment of the material.

The apparatus for treatment eonsists of two vessels placed one inside the other, leaving a hollow spaee between them. The inner vessel is perforated in its bottom and sides and is provided with tubes, likewise perforated, extending in the direetion in which the pressure acts and communicating with the space between the vessels. A perforated piston working in the inner vessel produees the mechanical pressure. Pipes are provided in the outer vessel for producing the vacuum and draining out the water.

Claims:—

1. A method of dessicating peat and the like by simultaneously applying pressure and a vaeuum, the said pressure and evaeuation being intermittently interrupted and at such interruption allowed to drop off to practically nought.

2. A method of dessicating peat and the like by alternately applying pressure and a vaeuum the said pressure and evaeuation, eaeh by itself, being intermittently interrupted, and at such interruption allowed to drop off to praetically nought.

149668—July 29, 1913. Edward Fox Strangways Zohrab, Baronet of Scotscalder, Thurso, in the County of Caithness, Scotland.

Improvements in or Relating to the Drying or Carbonizing of Peat.

The invention relates to a proeess of and apparatus for the treatment of peat for rendering the same in condition for industrial purposes, the ehief objeet being to obtain peat charcoal in a harder and more dense form than is possible by methods at present praetised. The peat after being ground and mixed with added water and moulded into bricks of suitable size, is dried in a rotary drying chamber, the sides of which are jacketed with hot air or steam, and is delivered from this chamber into a eharring oven for conversion into eharcoal and produetion of peat gas. The claims eover a grinding, kneading and moulding machine, ehamber or drum for drying the peat brieks, and eharring oven as deseribed.

151670—William B. Bottomley of King's College, London, Nov. 11, 1913.

Treatment of Peat for Manurial and Other Purposes.

According to this invention peat can be converted into an excellent manure by treating it with micro-organisms capable of producing ammonia. Such micro-organisms are obtainable by known methods from ordinary soil or from other sources such as putrefying bouillon. There are several species of them, such as Bacillus mycoides, Bacillus subtilis, Bacterium aerogens, and Bacterium fluorescens liquefaciens. It is not essential to use a pure culture of any particular species or of the mixed species, since other micro-organisms may be present.

The effect of these micro-organisms on the peat is to convert the humic acid and humous bodies contained in it into compounds soluble in water and at the same time to disintegrate the peat so that it is readily distributed.

A product richer in nitrogen is obtained if nitrogen-fixing organisms such as Azotobacter and Bacillus radicicola are present in the mass.

In addition to its usefulness as a manure, the product forms a ready source of the substances known as humic acid or humous bodies, which have lately found application in industry.

There is no difficulty in obtaining a culture of micro-organisms, containing no doubt very many species, suitable for the invention. For this purpose 10-20 grams of fertile soil may be added to a culture medium comprising 1 litre of water, 20 grams of dextrin, 1 gram of dipotassium phosphate, 1-2 gram of magnesium sulphate, 2 grams of calcium carbonate and 10 c.c. of bouillon. The scum which forms on the surface of the liquid in the course of a few days is suitable for the invention. Pure culture consisting of any of the individual species that are active for the purpose or mixed cultures may of course be prepared but this is not necessary.

To the peat or peat material is added water containing the organisms and the mass is allowed to undergo the change involved, for some days. When the peat has been dried, as is the case with certain prepared peat, the amount of water added should suffice to moisten the mass thoroughly. It is not however, necessary to dry the peat, for if this is in its natural wet condition it may be merely sprinkled with the water containing the micro-organisms. The process is preferably hastened by adding to the mass a nitrogenous organic material, particularly a weak solution of a soluble nitrogenous organic material, such as albumin, gelatin or meat extract; a solution containing say 0.25-0.5 per cent. of any standard meat extract, for example, will serve. Such a solution may constitute the liquid in which the micro-organisms may be contained as aforesaid. A very suitable nitrogenous extract consists of the waste liquor obtained from the boiling of bones.

It is also desirable to add a small proportion of a carbo-hydrate such as sugar or starch; say about 0.1 per cent. of the dry weight of the original peat, dissolved or suspended in a little water.

The saturated peat may be left at a temperature of 24°-30° C. for three weeks or thereabouts and may then be dried. In this condition it may be applied directly as a manure. Or before it is dried it may be sterilized, such as by live steam, and then further treated with nitrogen-fixing organisms for increasing the amount of nitrogen in the mass, these organisms being capable of growing in the altered peat.

If soluble humous substances be required the treated mass may be leached with water, and the solution used directly for any of the purposes to which humus is applied; or an acid may be added to precipitate the humic acid from the aqueous solution. The aqueous extract of the treated peat is also useful as a liquid manure.

Claims 1-16 cover the various methods of carrying out the process described in the above specifications, while Claim 17 is as follows:—

'As a new product peat or a prepared form of peat which has been subjected to the action of ammonia-producing micro-organisms and contains soluble humates.''

CORRECTION:—The number of Joseph Berglund's patent reported on page 29 of the August Journal should be 149571 instead of 179991 as there printed.

A recent British patent, No. 29429, 21st December, 1912, describes improvements in methods of handling peat fuel now followed at Okaer, Denmark, and elsewhere in Europe, devised by Lt.-Col. F. T. Warburton of the Royal Engineers, London, England.

According to the Report of Erik Nystrom (1908) with labour at 96 cents per day, machined air-dried peat was produced at Okaer at a cost of $1.50 per ton. The method employed in handling the peat as it came from the excavators was to pour it into dump cars for conveyance to the drying ground. From these it went into moulds containing from 50 to 70 cakes. The moulds were somewhat unwieldy and considerable loss of time occurred in the various operations.

Col. Warburton uses a smaller mould, preferably of galvanized iron, and of a size to be readily handled by two men, fitted with loose iron plates held underneath by two loose right angled brackets on each side so that the pulp cannot fall to the ground when they are lifted. A number of these moulds with bottom plates clasped on are laid on a platform car touching each other. The peat is poured in a bottomless box of the same area as the combined moulds

resting on an iron plate which can be raised or lowered to the level of the top of the moulds. The box filled with peat is pushed over the moulds, filling and smoothing them. The box is then withdrawn and the operation repeated with another set of moulds until the car is loaded. The moulds are conveyed to the drying ground where two men unload them, and when the peat is dry enough to retain its shape the bottom plates are withdrawn and the moulds raised and they are then ready for use again.

Col. Warburton claims a very considerable saving of time and increase of capacity as the result of his improvements, and estimates a saving in cost production of 48 cents per ton with other conditions similar to those described at the Okaer plant.

DRYING PEAT FOR GAS PRODUCERS.

A recently issued French patent describes a process whereby disintegrated peat is pressed into a thin cake between two endless filtering bands which pass between perforated metal supported plates or over a metal pulley and are suitably tensioned. The moisture in the peat is thus reduced 60 to 80 per cent. The peat is then further dried by exposure to hot air or to the heat of the sun. A suitable hot-air dryer comprises a chamber through which large quantities of hot air are blown in the upward direction, whilst the peat cake, in small pieces, travels from the top downward in a zig-zag path on a series of endless bands.—The Canadian Engineer.

THE JOURNAL OF THE CANADIAN PEAT SOCIETY

may be found on file at the following libraries:—

Parliamentary Library, Ottawa, Canada.
Library of the Geological Survey, Ottawa, Canada.
Library of the Mines Branch, Department of Mines, Ottawa, Canada.
Library of the Department of Labour. Ottawa, Canada.
Carnegie Library, Ottawa, Canada.
Legislative Library, Toronto, Ont.
Library of the Society of Chemical Industry, (Canadian Section), Toronto, Ont.
Public Reference Library, College and St. George Streets, Toronto, Ont.
Library of the Department of Education, Toronto, Ont.
Library of the University of Toronto. Toronto, Ont.
McGill College Library, Montreal, Que.
Library of the Canadian Society of Civil Engineers. Montreal, Que.
Library of the Canadian Mining Institute. Montreal, Que.
Library of the Department of Agriculture, Regina, Sask.
Library of the American Institute of Mining Engineers, New York, N.Y.
Library of The Chemists' Club, New York, N.Y.
Public Library, New York, N.Y.
Scientific Library, U.S. Patent Office, Washington, D.C.
Library of the Department of Agriculture, Washington, D.C.
Smithsonian Institution, Washington, D.C.
Library of the U.S. Geological Survey, Washington, D.C.
Library of Congress, Washington, D.C.
Library of the U.S. Bureau of Mines, Washington, D.C.
Pennsylvania State Library, Harrisburg, Pa.
State Library of Massachusetts, Boston, Mass.
Library of the University of Minnesota, St. Paul, Minn.

BACK NUMBERS.

Vol. No. 1—Only in sets comprising the whole of Volume 1	$1.00
Vol. 1 No. 2—Each	.25
Vol. 1 Nos. 3 and 4 combined	.50
Vol. 2 Nos. 1, 2, 3 and 4, each 25 cts.; Volume 2	1.00

Vol. 2 DECEMBER, 1913 No. 4

JOURNAL

OF THE

CANADIAN PEAT SOCIETY

Published Quarterly by the Society
Subscription Price - $1 per annum
Single Number - Twenty-five cents

CANADIAN PEAT SOCIETY
Room 22, Castle Building Ottawa, Canada